

**SUMMARY OF PACIFIC SALMON CODED-WIRE TAG  
APPLICATION AND RECOVERY, PRINCE WILLIAM SOUND, 1996**



by

**Timothy Joyce  
and  
Renate Riffe**

**REGIONAL INFORMATION REPORT<sup>1</sup> 2A96-43**

**Alaska Department of Fish and Game  
Division of Commercial Fisheries Management and Development  
333 Raspberry Road  
Anchorage, AK 99518**

**December 1996**

---

<sup>1</sup>The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate timely reporting of recently collected information, reports in this series undergo only limited internal review and may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without approval of the author or the Division of Commercial Fisheries Management and Development.

## **PREFACE**

**This report was prepared as part of cooperative agreements between the Alaska Department of Fish and Game, the Prince William Sound Aquaculture Association, and the Valdez Fisheries Development Association for State Fiscal Year 1997.**

## **AUTHORS**

Tim Joyce is Region 2 Area Resource Development Biologist, Prince William Sound/Copper and Bering Rivers, for the Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, P.O. Box 669, Cordova, AK 99754-0669.

Renate Riffe is Region 2 Research Biologist, Prince William Sound/Copper and Bering Rivers, for the Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, P.O. Box 669, Cordova, AK 99754-0669.

## **ACKNOWLEDGMENTS**

We would like to thank Melanie Guerrero, Fish and Wildlife Research Technician, and the dedicated crew of seasonal employees she directed for their long hours spent sampling commercial landings and hatchery brood stock collections for tagged salmon. Karen Crandall and her staff at the Alaska Department of Fish and Game Tag Laboratory in Juneau recovered coded-wire tags from salmon head heads shipped to them, decoded them, and provided this information for use in our analyses. David Evans, Biometrician, provided vital assistance in compiling and analyzing the data on which this report is based. Stephen Fried, Regional Research Biologist, provided assistance over the course of the study and reviewed this manuscript.

## **PROJECT SPONSORSHIP**

This investigation was funded by the State of Alaska, the *Exxon Valdez* Oil Spill Trustee Council and cooperative agreements between the State of Alaska, Prince William Sound Aquaculture Corporation, and the Valdez Fisheries Development Association.

## TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES.....	vi
INTRODUCTION.....	1
METHODS.....	2
Applying Tags .....	2
Recovering Tags.....	3
Estimating Hatchery Contributions.....	3
Estimating Survival Rates .....	8
RESULTS AND DISCUSSION.....	8
Applying Tags in 1996.....	9
A. F. Koernig Hatchery .....	9
W. H. Noerenberg Hatchery.....	9
Cannery Creek Hatchery .....	10
Solomon Gulch Hatchery .....	11
Main Bay Hatchery .....	11
Gulkana Hatchery .....	11
Hatchery Contributions to 1996 Harvest.....	12
Common Property Harvest.....	13
Pink Salmon .....	13
Sockeye Salmon .....	13
Chum Salmon.....	15
Coho Salmon.....	15
Cost Recovery Harvest.....	16
Pink Salmon .....	16
Sockeye Salmon .....	17
Chum Salmon .....	17

## TABLE OF CONTENTS (Continued)

	<u>Page</u>
RESULTS AND DISCUSSION (Continued)	
Survival Rates by Tag Code.....	17
CONCLUSIONS .....	18
TABLES.....	20

## LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Hatchery releases of pink salmon into Prince William Sound during 1995.....	20
2. Hatchery releases of pink salmon into Prince William Sound during 1996.....	21
3. Hatchery releases of sockeye, chum, coho salmon into Prince William Sound during 1996 .....	22
4. Survival rates by tag code of pink salmon returning to Prince William Sound in 1996.....	23
5. Pink salmon hatchery and wild stock contributions to Prince William Sound common property fisheries by origin, district and period of catch during 1996.....	24
6. Pink salmon hatchery and wild stock contributions to Prince William Sound cost recovery fisheries by origin, district and week of catch during 1996.....	29
7. Pink salmon hatchery and wild stock contributions to Prince William Sound hatchery broodstocks by origin and week during 1996.....	34
8. Pink salmon contribution by hatchery to Prince William Sound fisheries and broodstocks.....	37
9. Sockeye salmon hatchery contribution to Prince William Sound common property fisheries by origin, district and period during 1996.....	38
10. Sockeye salmon hatchery contribution to Prince William Sound cost recovery fisheries by origin and date during 1996.....	43
11. Sockeye salmon hatchery and wild stock contributions to Prince William Sound hatchery broodstocks by origin and week during 1996.....	45
12. Sockeye salmon hatchery contribution to Copper River common property fisheries by origin and period during 1996.....	46

## LIST OF TABLES (Continued)

<u>Table</u>	<u>Page</u>
13. Sockeye salmon hatchery contribution to Copper River personal use and subsistence fisheries by origin and period during 1996.....	47
14. Sockeye salmon hatchery contribution to Copper River escapements and hatchery brood stocks by origin and week during 1996.....	48
15. Survival rates by tag code of sockeye salmon returning to Main Bay hatchery in 1996.....	49

## INTRODUCTION

Primary reporting duties for the Prince William Sound Pink Salmon Coded-Wire Tag Project have been associated with generation of technical reports for the *Exxon Valdez* Oil Spill Trustee Council. While these reports provide much technical information, they do not evaluate day-to-day project operations and may not present all information desired by cooperating private non-profit aquaculture associations, i.e. the Prince William Sound Aquaculture Corporation (PWSAC) and Valdez Fishery Development Association (VFDA). In order to better address the information needs of the aquaculture associations, the Alaska Department of Fish and Game (ADF&G) agreed to submit a separate annual report which summarized tagging and tag recovery activities, presented estimates of hatchery contributions by fishing period and week, and provided survival rates of pink salmon by tag code and hatchery contribution rates of sockeye and chum salmon.

Funding for sockeye salmon coded-wire tag (CWT) recovery was initiated this year in a cooperative agreement with PWSAC and sockeye salmon tagging and recoveries will be summarized in this report. Hatchery sockeye salmon production is generated from two hatcheries, Main Bay and Gulkana, both operated by PWSAC. Most of the production from the Main Bay hatchery is harvested in the Eshamy District in Prince William Sound (PWS), but some is also harvested as remote release fish en route to Coghill, Eshamy and Marsha lakes. Gulkana hatchery production is generated from fry stockings into lakes on the Copper River system and the resulting production contributes to the marine commercial gill net fishery, the river sport dip net fishery and the subsistence fishery.

CWT information from sockeye salmon returning to the Copper River system is used to estimate the timing of returns and contributions to the common property commercial fishery and more recently to the sport dip-net fishery. No cost recovery occurs on the Copper River. All adult sockeye salmon returning to Main Bay are assumed to be hatchery produced and 40% of the adults are allocated to PWSAC.

Chum and coho salmon are briefly covered in this report to document the method used to provide an estimate of the hatchery return. Neither chum nor coho salmon were scanned for CWT's in the common property or cost recovery fisheries and hatchery contributions to the catches in the Coghill, Eshamy and Eastern Districts were estimated using historic information.

Management of the chum and coho salmon harvest does not involve CWT information. Wild stock interception concerns in the Wally H. Noerenberg (WHN) hatchery chum salmon fishery involve only the incidental harvest of Coghill lake sockeye salmon. Wild stock harvests are not considered significant in the hatchery coho salmon fisheries with nearly the entire coho salmon catch in the Coghill District and in the Port of Valdez considered to be of hatchery origin.



Management of the pink salmon harvests in PWS has become more complex with increased hatchery production. Harvesting the surplus hatchery production without over-harvesting the wild stock component is the responsibility of the area management biologist. This harvest must occur while the quality of the fish is still high and requires commercial harvests throughout the run. The CWT program was initiated so that inseason management decisions could be made. Data from tag recoveries from test and commercial common property fisheries are crucial to the separation of the hatchery and wild components in a mixed stock fishery and thus to the ability of managers to make informed decisions on fishing periods and times. CWT recoveries were also used to determine an appropriate cost recovery catch for PWSAC, their harvest and broodstock being based on 40% of the total hatchery return.

The CWT program consists of two components, tag application and tag recovery. Pink salmon have a two year life cycle, and tag application occurs in the year prior to the tag recovery. Tags are applied to emergent fry at a predetermined ratio and checked for retention prior to their release. Those applied in 1995 were recovered in 1996, while those applied in 1996 will be recovered in 1997.

The marine residency of hatchery produced sockeye salmon is variable, and tags applied in 1996 at the Main Bay and Gulkana facility will be recovered over several years. Tag recoveries from the summer of 1996 provide hatchery contribution estimates, but can only provide partial survival information for most brood years as some year classes have yet to return.

## METHODS

### *Applying Tags*

Four hatcheries produce pink salmon, two produce sockeye salmon and two produce chum salmon in PWS. Tagging procedures are similar at all hatcheries and are described in detail in the 1994 Coded-Wire Tag Project Report to the *Exxon Valdez* Oil Spill Trustee Council (Restoration Project 94320B). Fry to be tagged are randomly selected from their release group, marked, and released with their cohorts. Usually, about one pink salmon fry in every 600 is tagged prior to their release at the hatcheries in PWS. At Main Bay hatchery about one sockeye salmon in every 40 is tagged. Gulkana hatchery has been an exception where sockeye salmon tagging ratios have ranged from one in 7 to one in over 70. Efforts were started this season to standardize the tagging ratio from this hatchery's production at one in 15.

A total of 1,156,042 pink salmon fry were tagged in 1996 at PWS hatcheries, of which 1,057,611 were released with valid tags. No tagged sockeye salmon were released on site at Main Bay in

1996 because of a water line failure and the necessity to release nearly all the hatchery smolt in January, and therefore prior to tagging. There were however 27,950 pre-smolt tagged with 22,129 released with valid tags into Coghill lake and another 5,370 released with valid tags into Marsha lake in November of 1995. The Gulkana hatchery tags smolt as they migrate through weirs on Summit and Crosswind lakes. Tags are not applied to smolt from Paxson lake because of a large wild population that migrates from that lake. A total of 25,045 and 111,466 smolt were tagged at Summit and Crosswind lakes with 25,013 and 110,612 valid tagged smolt released at the respective lakes. The difference in the number tagged and valid tags released can be attributed to mortality and loss of tag prior to release.

### ***Recovering Tags***

Tags are recovered inseason from pink and sockeye salmon harvested during common property and cost recovery fisheries after each fishery opening. As salmon are pumped from tenders onto conveyer belts in processing plants, ADF&G technicians count every salmon examined and remove the head from every salmon with a missing adipose fin. An attempt was made to sample about 20 % of the total harvest of pink salmon and 5% of the total harvest of sockeye salmon in this manner to ensure that a sufficient number of tags are collected to produce accurate and precise estimates of hatchery contributions.

Tags are recovered daily from hatchery brood stocks during the egg take procedure at each facility. All of the pink and sockeye salmon utilized by the hatchery for egg production, egg sales or surplus are examined for tags. These fish are counted and the head is removed from any fish with a missing adipose fin.

All of the sampled heads were sent to the CWT laboratory in Juneau, Alaska where the tag was removed and the code read and recorded.

### ***Estimating Hatchery Contributions***

For this report, pink salmon common property and cost recovery fishery samples were stratified by district, week, and processor.

The contribution of release group  $i$  to the sampled common property and cost recovery harvests, escapements and brood stocks  $C_i$ , was estimated as:

$$\hat{C}_t = \sum_{i=1}^L x_{it} \left( \frac{N_i \hat{a}}{s_i p_t} \right),$$

where

$x_{it}$	=	number of group $t$ tags recovered in the $i$ th stratum,
$N_i$	=	total number of fish in the $i$ th stratum,
$s_i$	=	number of fish sampled from the $i$ th stratum,
$p_t$	=	proportion of group $t$ tagged,
$a$	=	historical adjustment factor associated with WHN facility (1989 through 1996); and,
$L$	=	number of recovery strata associated with common property, cost recovery, brood stock, and special harvests in which tag code $t$ was found.

The WHN adjustment factor, for a given year is estimated as the ratio of sampled pink salmon in the brood stock to the expanded number of fish based on tags found in the sample and is expressed as:

$$\hat{a} = \frac{s}{\sum_i^T \frac{x_i}{p_i}},$$

where

$T$	=	number of tag codes released from the WHN hatchery in previous year.
$p_i$	=	tagging rate at release for the $i$ th tag code (defined as number of tagged fish released with the $i$ th code divided by the total number of fish in release group $i$ ),
$x_i$	=	number of tags of the $i$ th code found in $s$ and,
$s$	=	number of brood stock fish examined in the WHN brood stock.

The adjustment factor used in 1996 was calculated as the mean of all WHN hatchery adjustment factors for the period 1989-1996. An adjustment factor based only on data from WHN hatchery was used for all hatcheries since we believe this is the only facility at which significant numbers of pink salmon from either wild runs or other hatcheries do not occur in the brood ponds. Pink salmon straying from other hatcheries or wild runs will lead to an erroneously inflated adjustment factor. The purpose of an adjustment factor is to remedy violations of the assumptions that 1) mortality of tagged and untagged pink salmon within a release group is the same and 2) marked pink salmon do not lose tags.

An additional adjustment factor was developed in 1995 when it appeared that a very high percentage of pink salmon missing an adipose fin caught in the Northern District did not contain tags. The Cannery Creek hatchery has had chronic difficulty with some type of interference causing false positives in the quality control device (QCD), and this could have led to an excessive number of fry released without tags. The same problems occurred in 1996 with the QCD and no reasonable solution has been found to correct it.

The adjustment made for the apparent tag loss associated with catches dominated by fish from the Cannery Creek facility was conducted as follows. The proportion of clipped fish which possessed tags in catches from strata believed to contain negligible quantities of fish from the Cannery Creek facility ( $E$ ) was estimated:

$$\hat{E} = \frac{\sum_{i=1}^l y_i}{\sum_{i=1}^l z_i},$$

where

- $y_i$  = the number of tags found in the  $i$ th stratum
- $z_i$  = number of heads collected in the  $i$ th stratum (minus heads lost and tags misplaced at tag lab), and,
- $l$  = number of recovery strata containing appropriate samples (see following paragraph).

The number of clipped fish sampled from strata likely to contain significant contributions from the Cannery Creek facility was then multiplied by  $\hat{E}$  to obtain an 'expected' number of tags. If the result was greater than the number found, the difference (T) was allowed to contribute to the hatchery contribution as T\*Cannery Creek expansion factor \*WHN adjustment factor.

An adjustment factor of 1.2 was used for the Main Bay hatchery sockeye salmon returns. This adjustment factor is constant and has been used since tagging of sockeye salmon began at Main Bay hatchery.

Adjustment factors for sockeye salmon from Gulkana hatchery were based solely on 1996 samples because of a lack of historical data. The Gulkana hatchery stockings exhibited widely different adjustment factors for different stocking locations. An adjustment factor was not needed for fish

stocked into Summit lake, since the expected number of fish based on tag recoveries approached the number of fish actually sampled. In contrast, the adjustment factor calculated for Crosswind lake was 2.65. The expected number of fish, or number of tags recovered multiplied by respective tagging rates, was about 38% of the actual number of fish examined for tags. The disparity between actual and expected numbers of fish sampled implies that fish tagged at Crosswind lake experienced some combination of high tag loss rates and higher mortalities than their untagged cohorts. Nearly 19% of the heads recovered during the first part of the sampling effort at Crosswind lake did not contain a tag, this percentage dropped to under 3% by the end of the sampling effort. The calculations for Crosswind lake were made more complicated than those for Summit lake because of a subsampling procedure used on the Crosswind lake adults. Assuming the subsampling was random little impact would be expected on the adjustment factor.

The contribution of release group  $t$  to unsampled strata,  $Cu_t$ , was estimated from contribution rates associated with strata which were sampled from the same district-week openings as the unsampled strata and is expressed as:

$$\hat{C}u_t = \sum_{i=1}^U \left[ N_i * \left( \frac{\sum_{j=1}^S \hat{C}_{tj}}{\sum_{j=1}^S N_j} \right) \right],$$

where

- $U$  = number of unsampled strata,
- $N_i$  = number of fish in  $i$ th unsampled stratum
- $S$  = number of strata sampled in the period in which the unsampled stratum resides,
- $C_{tj}$  = contribution of release coded with tag  $t$  to the sampled stratum  $j$ , and
- $N_j$  = number of fish in  $j$ th sampled stratum.

A variance approximation for  $C_t$ , derived by Clark and Bernard (1987) and simplified by Geiger (1990) was used:

$$\hat{V}(\hat{C}_t) = \sum_{i=1}^L x_{it} \left[ \frac{N_i \hat{a}}{S_i p_t} \right] \left[ \frac{N_i \hat{a}}{S_i p_t} - 1 \right].$$

Summation of variance components over all tag codes provided an estimate of the variance of the total hatchery contribution.

Estimation of the wild stock production from Coghill and Eshamy lakes was made by summing all of the sockeye salmon harvested and removing all the hatchery production calculated from CWT recoveries. All sockeye salmon caught in the Coghill District in excess of hatchery production were assumed to be Coghill wild stock. All sockeye salmon caught in the Eshamy District not attributed to hatchery production prior to July 5 were considered Coghill wild stock. The time period from July 5 to July 20 was considered a transition period in the Eshamy District between Coghill stock and Eshamy stock sockeye salmon. An arbitrary 25% of the sockeye salmon caught not attributed to hatchery production was considered Coghill wild stock. The remaining wild sockeye salmon harvested in the Eshamy District were divided into production groups of 25% Eshamy stock and 50% other wild stocks. Any wild sockeye salmon stock production after July 20 was considered to be 100% Eshamy stock. All the sockeye salmon harvested in the Southwest District not attributed to hatchery production by CWT recoveries were considered Eshamy wild stock production. Wild stock sockeye salmon harvested in other districts were considered as contributions from other stocks and not included in either the Coghill or Eshamy lake production.

Estimates of contributions of chum salmon produced by the WHN hatchery to the common property and cost recovery fisheries were made by subtracting a pre-hatchery average catch from the years 1971 through 1983 (121,621) from the total catch in the Coghill District. The chum salmon catch in the Eshamy District was treated slightly differently and is much more suspect. There is no historic chum salmon catch prior to July 31 in this district. Historically, the Eshamy District opened for harvesting Eshamy lake sockeye salmon in late July and August and the chum salmon that were captured incidentally at that time were of late stock origin. It was only after the initiation of hatchery production of early chum salmon that fishing occurred in June and early July in the Eshamy District. As a result, no historic catch of early run wild stocks exists. Only one year of CWT recovery data exists for the Eshamy District chum salmon catch prior to July 31 and that was in 1994. Based on the CWT recovery that year an estimated 7,730 wild chum salmon were captured. This number was subtracted from the Eshamy District chum salmon harvest prior to July 31 to arrive at the hatchery contribution rate for 1996.

The Solomon Gulch hatchery chum salmon production was estimated in a similar manner to that of the WHN hatchery. The average wild chum salmon catch from 1978 - 1984 (157,077) in the subdistrict encompassing the Valdez arm was subtracted from the total catch in that area in 1996 to arrive at the hatchery contribution. Nearly all of the catch in the Eastern District came from that subdistrict as the fishing fleet was restricted to harvesting only hatchery pink salmon stocks by the fish processing plants, thus the only chum salmon landed were those captured incidental to the pink salmon fishery.

Pre-hatchery historical catches of coho salmon in the Coghill District averaged 1000 fish while those in the subdistricts around the Valdez arm in the northern part of the Eastern District near the Solomon Gulch hatchery averaged 500 fish. The hatchery production of this species at these

two sites is based on the total catch less the historical catch plus the estimated sport catch, cost recovery catch and brood stock.

### *Estimating Survival Rates*

The survival rate of the release group coded with tag  $t$  ( $S_t$ ), was estimated as:

$$\hat{S}_t = \frac{\hat{C}_t + \hat{C}_{ut}}{R_t},$$

where

- $C_t$  = contribution of release group coded with tag  $t$  to sampled strata,
- $Cu_t$  = contribution of release group coded with tag  $t$  to unsampled strata,
- $R_t$  = total number of fish in release group coded with tag  $t$  released from hatchery.

Assuming the total release of salmon associated with a tag code is known with negligible error, and that the cumulative variance contributions associated with the unsampled strata are small, a suitable variance estimate for  $S_t$  is given by:

$$\hat{V}(\hat{S}_t) = \frac{\sum_{i=1}^L x_{it} \left[ \frac{N_i \hat{a}}{s_i p_t} \right] \left[ \frac{N_i \hat{a}}{s_i p_t} - 1 \right]}{R_t^2}.$$

## **RESULTS AND DISCUSSION**

Much of the information supplied in the following section was derived from CWT summary reports submitted by each facility that applied tags in 1996. The tags that were applied in 1995 are listed in Table 1 since those fish returned as adults in 1996.

## *Applying Tags In 1996*

### **A. F. Koernig Hatchery**

Rates of emergence and migration of 1996 pink salmon fry were approximately 10 days earlier than usual. All treatment groups were tagged at a ratio of approximately 1:600 (Table 2). Some of the smaller fry were excluded from the tagging process as they contributed disproportionately to the over-night mortality from physical damage from the tagging process. Exclusion of a group of fish based on size can introduce a bias into the process since all size ranges are counted as emergent fish. If only the large, healthy fish are included in the tagging process the survival rate of the tagged fish could be higher than the overall population indicating a larger return than actually occurred.

An unexpected out-break of *Vibriosis sp.* required that the late, large rearing strategy group be released early and were released on the same day as the late, fed group. A small portion of one pen containing tag code 01031412 was held for the duration of the late, large experiment, but the exact number of fish remaining in the pen after a large portion of the pen was released is not known. In essence, one tag code represents two groups of fish of unknown number. Survival by tag code calculations (Table 4) require a known number of tagged fish released as well as a known number of untagged cohorts. Attributing survival information to the above tag code will be problematic.

Overall, the fish size at release was larger than in 1995 except for the late, large rearing strategy group which was considerably smaller because of the early release. Some problems arose with fish food quality during the rearing process which may have contributed to the disease outbreak and possibly affect the survival of the released fish.

### **W. H. Noerenberg Hatchery**

This facility produces pink, chum, coho, and chinook salmon (Tables 2 and 3). For this report, the emphasis for this hatchery is on pink, chum and coho salmon. In 1996, the size of pink salmon fry at release was similar to that of the previous year. In 1996, all of the fry were released at once in an attempt to overwhelm predators. Plankton conditions were good, but as with the A.F. Koernig (AFK) hatchery, fish food quality problems may have contributed to a *Vibriosis sp.* outbreak which could affect the overall survival of the released fry. The late, large release strategy did not make the target size goal because of the disease and food quality problems, but they did approach or exceed one gram in size.



In 1996, one bucket of tagged pink salmon fry, code 1301031204, was spilled which caused the release of 106 fry prematurely. These fry represented about 2% of the total tagged group, but were counted as mortality as marine survival conditions were very poor in the middle of March when they were released. This tag code represents a late, large release group and the few escapes are not expected to contribute to the returning adult population. Three tag codes, 1301031202, 1301031208, and 1301031205, exceeded the 1: 600 tag ratio because of a release line leak causing an undetected mortality in the untagged groups. The tag ratio ranged from 1:575 to 1:543. Two of these tag codes represent the late, large release strategy and may cause a slight over estimation of the hatchery return based on detected-tag information.

The chum salmon fry tagging operation suffered similar problems. Three tag codes were applied at a higher ratio than 1:500; the highest rate was 1:463 (Table 3). Since detected-tag data are not used for the hatchery contribution rate this error is insignificant as only decoded information is used to calculate survivals from the release groups and the difference in tagging ratios will be used in this calculation.

### **Cannery Creek Hatchery**

The tagging rate in 1996 varied from the desired 1:600 ratio in about half of the release groups (Table 2). Some groups did vary as much as 12% from the desired ratio because of a recalculation in the number of unmarked fish loaded into the rearing pens. During the peak of the pink salmon outmigration the electronic counters were overloaded and would under count the number of fry passing through the system. An adjustment was made to the total pen loading number, but a corresponding adjustment was not made to the number of fish tagged which resulted in tag ratios as high as 1:674. Ratios above 1:600 will tend to underestimate the hatchery contribution to the fishery when using detected-tag information. Cannery Creek also has had a chronic problem with some type of interference causing false positive signals in the QCD during the tagging process. The result has been very poor tag retention and some difficulty in assigning a contribution to this hatchery. Deviation from the tagging ratio to a higher rate will exacerbate this problem. Attempts should be made in the future to anticipate the electronic counter error during the peak outmigration and if a compensation factor is applied it should also be applied to the tagged fish to maintain a 1:600 ratio.

The failure of the QCD to function properly during the tagging operation can cause problems during analysis of tag recovery data. Tagging personnel routinely check their tag placement by examining the number of fry determined by the QCD not to have received a tag. If the QCD malfunctions, there is an understandable tendency for the taggers to ignore it with the consequence that tagging is conducted with no quality control until a later manual check. By this time, several thousand fish may have been poorly tagged causing a higher than normal tag loss rate in the returning adult fish. The percentage of fish returning to the hatchery brood stock in

1996 that were clipped, but contained no tag was quite high averaging 57.9%. An additional adjustment was applied to calculate this hatchery's contribution, similar to that used in 1995.

### **Solomon Gulch Hatchery**

At this facility, estimates of the number of pink salmon fry in each release group were obtained by calculating the mortality throughout the incubation and emergence period and subtracting that number from the estimated loaded number of eggs. This method is probably not as accurate as that which uses electronic fry counters and must be viewed as an approximation which is probably within 10% of the actual number. In 1996, poor weather again delayed loading outmigrating fry into the net pen rearing complex. This delay caused many incubators of fry to absorb most if not all of their yolk and become emaciated and weak. Survival of the first few pens will probably be reduced slightly because of the condition of the fry at emergence.

Fish tagged with code 1301031113 were an early release group. Unfortunately, one bucket containing 2,862 tagged fry with code 1301031114 which was for a late release group were placed in with the early release group. The result will be that any survival information from these two codes for their respective group will be suspect and not be valid. The tagging ratio of 1:600 was not violated to a great extent and the detected-tag method for inseason adult return calculation should not be affected. (Table 2).

### **Main Bay Hatchery**

Main Bay hatchery only tagged presmolt sockeye salmon from the 1995 brood year. A pipeline failure in January of 1996 caused the premature release or death of most of the fish being held to smolt size. A few hundred thousand survivors were released in the spring of 1996, but no tags were applied to those smolt.

A total of 865,020 presmolt were stocked into Coghill lake in November of 1995. Another 215,944 presmolt were released into Marsha lake. Both groups were stocked without incident and both were within 2.5% of the tag ratio of 1:40.

### **Gulkana Hatchery**

The hatchery operation at Gulkana is not typical. This hatchery stocks emergent fry into under-utilized lakes and then captures the out migrating smolt the following year for enumeration and tagging. The smolt out migration from Summit lake started on May 30 and continued through

July 10 with the smolt averaging 6.5 grams. A total of 373,764 smolt migrated from the lake. Crosswind lake's smolt out migration was much more compressed this season than in past years with 95% of the out migration occurring between June 2 and June 11. A total of 1,658,084 smolt averaging 7.99 grams migrated from Crosswind lake.

Prior to this year a set number of tags were applied to the out migrating smolt from two stocked lakes, Summit and Crosswind. The result of this application method was that tag ratios varied wildly between the two lakes and between years. These wide variations prevented the tagged fish recoveries from being used inseason as a management tool. Contribution rates could only be made after tags were decoded, and this took from 5 to 10 days. Starting in 1996 a tag ratio of 1:15 was established as the standard ratio to be used for both lake systems each season. Once all the year classes returning are from these standard tagging ratio releases, inseason hatchery contributions can be calculated using only detected-tag information. Managers can then use this information in determining fishing time and area both in the commercial gill net fishery and in the sport dip net fishery as it is generally available within 48 hours of a fishery closure.

### ***Hatchery Contributions To 1996 Harvest***

Hatchery contributions of pink salmon to the common property fisheries within each district were estimated for each period of the 1996 fishing season (Table 5). Hatchery contributions of pink salmon to the cost recovery fisheries within each district were estimated by date for the 1996 season (Table 6). Hatchery contributions of pink salmon to the brood stock for each hatchery were estimated by date for the 1996 season also (Table 7). Hatchery contribution estimates by date are similar to those calculated by statistical week. Some disparities may be found, however, due to the different way in which data were stratified.

The average rate of tag retention,  $\hat{E}$ , was estimated at 0.74. It is stressed that a major assumption made when using this quantity to estimate contributions is that all heads selected by samplers originate from fish possessing a bona fide fin clip. This is a somewhat contentious issue since samplers are advised to select heads if there is any doubt what so ever regarding the presence of a fin clip. A variance estimate was not calculated for  $\hat{E}$ . Since tag loss is also dealt with in the WHN adjustment factor,  $\hat{E}$  and the WHN adjustment factor are not independent, and some work is required to ascertain an appropriate expression for the estimation of the variance of contributions in which  $\hat{E}$  plays a role.

The hatchery contributions of sockeye salmon to the common property fishery, cost recovery and brood stock within each district were estimated in the same manner as described above for pink salmon.

The hatchery contribution of chum salmon to the common property, cost recovery and brood stock was done postseason using the total salmon captured rather than by period or statistical week.

The hatchery contribution of coho salmon to the common property, cost recovery and brood stock was done postseason using the total salmon captured rather than by period or statistical week.

## **Common Property Harvest**

***Pink Salmon.*** The 1996 pink salmon return to PWS of 28.765 million ranks fifth out of the last 20 years. The total harvest in PWS was 26.456 million pink salmon. The common property pink salmon harvest was 17.725 million and 8.731 million were taken during cost recovery fisheries which includes roe stripped fish. In addition, 825.3 thousand were taken as brood stock and 1.483 million naturally escaped into index streams. Returns to Solomon Gulch hatchery were strong for a third year in a row with a total return of 7.186 million fish. Cannery Creek hatchery had the next highest return at 6.631 million followed by WHN with 5.265 million and AFK with 1.767 million adults (Table 8). Wild stock runs were generally strong on the east side of PWS and slightly below average on the west side with the exception of the Southwest District where runs were generally weak.

In 1996, pink salmon produced by Cannery Creek hatchery comprised the largest portion of the common property harvest (Table 5). The remaining common property harvest was produced, in order of abundance, by Solomon Gulch hatchery, wild stocks, WHN hatchery, and AFK hatchery. In general, the largest contributor to a district was the nearest hatchery producing pink salmon.

The contribution by PWSAC to the common property fishery amounted to 9.674 million pink salmon. The total number of pink salmon caught in the cost recovery harvest by PWSAC amounted to 6.170 million fish. The total number taken for brood stock at PWSAC hatcheries was 597 thousand fish. Thus, the corporation's share was 6.767 million pink salmon. The post season analysis indicates that the PWSAC cost recovery and brood stock amounted to 41.2% of the corporation's contribution to the common property fishery ( $\text{Corporation share} / (\text{Common Property contribution} + \text{Corporation share})$ ).

***Sockeye Salmon.*** The 1996 sockeye salmon common property catch in PWS including the Copper and Bering River Districts is estimated to be 2.91 million fish. The cost recovery harvest at Main Bay hatchery totaled 75.5 thousand sockeye salmon. No cost recovery harvest occurred at the Gulkana hatchery. The cost recovery harvest at Main Bay for the middle stock run was managed in aggregate with the chum salmon harvest at the WHN hatchery since the latter is based

on a dollar value rather than a percentage of the adult return, a cost recovery percentage is not calculated.

The return to **Main Bay** hatchery from the early run zero-check release was estimated at 700 sockeye salmon. A total of 154 early run fish were used for brood stock (Table 11) and the rest were captured during cost recovery (Table 10).

The return from the mid-run release was 196.2 thousand sockeye salmon. A total of 160.5 thousand mid-run sockeye salmon were taken in the common property fishery (Table 9) including 7.4 thousand fish taken in the Copper River District (Table 12) and 35.5 thousand were taken during cost recovery (Table 10). An estimated 300 mid-run fish were utilized as brood stock during the late run egg take (Table 11).

The late run return totaled 120.4 thousand sockeye salmon. The common property catch of the hatchery late run sockeye salmon amounted to 75.8 thousand adults (Table 9) which includes 1.2 thousand sockeye salmon taken in the Copper River District (Table 12). A total of 39.5 thousand sockeye salmon were cost recovered (Table 10) and 5.1 thousand fish were taken as brood stock (Table 11).

The Gulkana hatchery contributed an estimated 314.9 thousand sockeye salmon to the commercial gillnet fishery from stockings in Crosswind, Summit and Paxson lakes. The commercial fishery caught 200.4 thousand Crosswind lake and 9.6 thousand Summit lake sockeye salmon. Since Paxson lake stockings are not marked, no estimation using CWT's can be made. It is assumed that the survivals of the Paxson lake stockings are halfway between those of Summit and Crosswind lakes which results in an estimated commercial catch of 105 thousand Paxson lake sockeye salmon (Table 12).

The Personal Use fishery on the Copper river harvested 95.6 thousand sockeye salmon which included an estimated 17.2 thousand hatchery produced sockeye salmon. Again, the Paxson lake contribution had to be estimated without the aid of CWT recovery data (Table 13).

The hatchery produced sockeye salmon that were used as brood stock or were excess brood stock at Gulkana hatchery and those counted on the spawning grounds at Summit lake and Crosswind lake totaled 145.9 thousand adults. All sockeye salmon returning to Crosswind lake and all the late run sockeye salmon that returned to Summit lake were assumed to be hatchery produced. All sockeye salmon returning to the Gulkana hatchery sites were also assumed to be hatchery produced (Table 14). Since sockeye salmon returning to the Gulkana hatchery do not carry CWT's and a small local population of wild fish exists, assignment of all fish returning to the hatchery is not strictly valid. One could argue, however, that since such a local population did not exist prior to the hatchery, the 'wild' population could indeed be looked upon as a hatchery population. Approximately 5.5 thousand adults are allowed to spawn naturally in the spring water creeks below the hatchery. The total number of hatchery produced sockeye salmon that passed the Miles lake sonar is estimated to be 163.1 thousand fish.

Returns of fish reared at the Main Bay hatchery include adult sockeye salmon returns from remote releases at Coghill lake, Eshamy lake, and Marsha lake. A total of 20.9 thousand adult sockeye salmon were caught as a result of the Marsha lake fry stockings, 10.8 thousand in the common property fishery (Table 9) including 300 in the Copper River District (Table 12) and 10.1 thousand in cost recovery (Table 10).

Returns to Coghill lake amounted to 242.6 thousand sockeye salmon, of which 110.8 thousand were hatchery produced (Tables 9 & 12). Contributions to the common property fishery by Coghill lake hatchery stockings were made in the Coghill District, Eshamy District, Eastern District, Southwestern District and the Copper River District. The common property catch of wild Coghill lake sockeye salmon was 93.1 thousand fish (Tables 9 & 12). A directed cost recovery harvest did not occur at Coghill lake. The escapement into Coghill lake totaled 38,693 fish. No CWT's were found in the escapement indicating that the entire escapement was composed of wild fish. The hatchery remote released sockeye salmon contribution came from brood years 1991 and 1992. The brood year 1991 smolt were released in 1993 and were identified as Coghill/Davis. The brood year 1992 smolt were released in 1994 and were identified as Coghill. Both smolt releases went into the Coghill river estuary.

Eshamy lake had a total return of 68.0 thousand sockeye salmon of which 48.2 thousand were hatchery produced (Tables 9 & 11). No directed cost recovery fishery occurred at Eshamy lake, but 1.2 thousand wild sockeye salmon attributed to Eshamy lake production were used in the Main Bay hatchery brood stock (Table 11). There were 13.4 thousand wild Eshamy sockeye salmon caught in the common property harvest (Table 9). The escapement into Eshamy lake was far below expected at 5,271 sockeye salmon when the counting weir was removed on Aug. 27 and was composed entirely of wild stock fish.

The return to the Copper River system was the highest on record at 3.263 million sockeye salmon. The commercial common property catch in the Copper River District was 2.356 million sockeye salmon. The escapement past the sonar counters at Miles lake totaled 906.9 thousand sockeye salmon. The Gulkana hatchery contribution to this return is not precise since accurate smolt outmigration numbers from hatchery stockings are not known for the three ocean fish from Crosswind and Summit lakes and none of the Paxson lake stockings. Based on CWT recoveries, smolt outmigration estimates, and an assumed average survival between Crosswind and Summit lakes for the Paxson lake fish, the hatchery contribution to the Copper River run was estimated to be 478.0 thousand sockeye salmon (Tables 12, 13 & 14).

**Chum salmon.** The chum salmon return to Eshamy and Coghill Districts totaled 1.875 million adults. The WHN hatchery production was calculated to be 1,745 million chum salmon adults (total catch - (historical average wild catch prior to 7/31 in Coghill District + 1994 wild catch in Eshamy District) + brood and excess brood). The common property chum salmon catch in the Coghill District was 613.4 thousand and 32.8 thousand in the Eshamy District. The cost recovery

catch in the Coghill District was 1.057 million and 5.2 thousand in the Eshamy District. The total brood stock available was 140.5 thousand which includes holding mortality and fish remaining after the egg take was complete. An additional 25.9 thousand chum salmon were in excess of brood stock needs and were salvaged for their roe at the hatchery.

There was no catch from the Port Chalmers area either as common property or as cost recovery. Less than 200 chum salmon were reported in the area available for harvest from aerial surveys. Therefore, no attempt has been made to attribute any chum salmon in the Port Chalmers area to hatchery production

The total chum salmon return to the Valdez area was 438.7 thousand adults. The common property catch in the Eastern District was 340.4 thousand adults. The total cost recovery catch of chum salmon at Solomon Gulch hatchery was 11.0 thousand fish. The total number of chum salmon that were excess brood and salvaged for roe was 87.3 thousand adults. The Solomon Gulch hatchery production was calculated to be 281.6 thousand chum salmon (total catch - (historical wild chum salmon catch in the Valdez statistical area) + brood and excess brood).

***Coho salmon.*** The total coho salmon return to the Valdez area was estimated at 148.1 thousand adults. This estimation was made without the input from sport fish state wide harvest surveys as they will not be generated until next year. After the removal of the historical wild catch from that area the total hatchery contribution is estimated to be 147.6 thousand fish which equates to 11.3% survival from release.

The total coho salmon return to the Coghill District was estimated to be 75.5 thousand adults. the same problem exists for the sport fish catch in this area as it does in the Valdez area. After the removal of the historical wild catch the hatchery return is estimated to be 74.5 thousand which equates to 3.6% survival.

### **Cost Recovery Harvest**

***Pink Salmon.*** Cost recovery harvests were stratified by statistical week (Table 6). Daily harvests were not sampled in all cases, so a number of daily strata had to be combined. In general, contributions to cost recovery harvests from hatcheries other than the one of origin were small. Main Bay hatchery was a notable exception. Since Main Bay hatchery produces only sockeye salmon, the 6.0 thousand pink salmon sold in their cost recovery operation originated from other locations as did the 5.2 thousand chum salmon. The pink salmon cost recovery harvest at the WHN hatchery was the highest at 4,243.8 thousand. The remaining hatchery cost recoveries of pink salmon are in the following order of abundance: Solomon Gulch, 2,560.1 thousand; Cannery Creek, 1,919.9 thousand; and Main Bay, 6.0 thousand. AFK hatchery did not undertake a cost recovery harvest, but rather had 100 percent of the hatchery production caught in the common

property fishery. Table 6 contains the individual hatchery contribution to the cost recovery harvest.

**Sockeye Salmon.** Main Bay hatchery cost recovered 75.5 thousand sockeye salmon. Since this cost recovery was in aggregate with the WHN hatchery chum salmon cost recovery a percentage of the catch was not computed. The cost recovery occurred on the Eyak, Coghill and Eshamy stocks that returned to Main Bay hatchery in 1996. In addition, 10.1 thousand sockeye salmon were cost recovered from adult returns from a remote fry stocking at Marsha lake. No cost recovery occurred on the sockeye salmon produced by the Gulkana hatchery.

**Chum Salmon.** The WHN hatchery cost recovered 1.057 million chum salmon. These fish were counted in aggregate with sockeye salmon from Main Bay and as a result a percentage of the production was not calculated. Main Bay hatchery also cost recovered 5.2 thousand chum salmon incidental to their sockeye salmon harvest. It should be noted that the value of the chum salmon captured at the WHN hatchery declined rapidly through the season from a large supply as well as from declining quality.

A directed cost recovery did not occur at the Solomon Gulch hatchery, but 11.0 thousand chum salmon were captured incidental in the pink salmon cost recovery. In addition, 87.3 thousand adult chum salmon were salvaged for their roe at the hatchery as that hatchery is no longer propagating that species.

### ***Survival Rates by Tag Code***

The experimental release groups which were released in June of 1995 at over one gram survived at higher levels than those released with other treatments. Those released from the WHN hatchery averaged 7.6% survival while those released from the AFK hatchery at approximately the same size survived at 3.6%. The survivals of the other release groups at the WHN hatchery averaged 3.1% and those at the AFK hatchery averaged 1.7% (Table 4). These survivals are not as impressive as last year, but still indicate that the larger fish size does considerably improve fry survival. The survivals indicated have not been adjusted for the Cannery Creek excessive tag loss and as a result are inflated by a small amount. However, the ratio between the tag codes would remain the same.

It is interesting to speculate on the reasons for the improved survival of the larger pink salmon fry. It could have been that they avoided predators either because of their larger size, or because the timing of their outmigration did not coincide with that of a significant predator population. It could also be that sea water temperatures and plankton abundance were more conducive for



survival at that time of year. An analysis of the economic return afforded by these high survival rates certainly warrants further study. No other trends could be found in any of the other release groups from either the AFK or WHN hatcheries (Table 4).

There are no apparent trends in survival rates for Cannery Creek pink salmon (Table 4 ). However, because of the high tag loss rate in the Cannery Creek fish this data should be viewed with caution. It is unknown at this time whether the tag loss occurred evenly throughout all tag codes or if some codes lost tags at higher rates. It is possible that the fish tagged early in the season lost their tags at a higher rate than fish tagged later in the season.

Consistent with recent years, pink salmon survival rates tended to be higher in the eastern portion of PWS. The survival rate associated with the Cannery Creek hatchery was the highest overall at 5.1%; that associated with the Solomon Gulch hatchery was lower at 3.5%, which was slightly higher than the 3.1% survival at the WHN hatchery. The survival rate of fish released from the AFK hatchery was the lowest at 1.6% (Table 8). Environmental factors which could have caused this trend include, but are not limited to, water circulation patterns, food availability, presence of predators, and lingering effects of the 1989 oil spill.

Sockeye salmon survivals from brood year 1991 are complete and are listed in Table 15. The brood year 1992 survivals are only partially complete as the three ocean fish will return in the summer of 1997. The 1992 brood year is listed to provide a look at the trend for some of the release groups, but will not be conclusive until next year.

## CONCLUSIONS

- 1) Hatchery production of pink salmon in PWS was average for 1996 with good returns to the Cannery Creek hatchery and average returns to the WHN and Solomon Gulch hatcheries and a poor return to AFK hatchery.
- 2) Reasons for low survival rates of pink salmon released from the AFK facility are not known at this time, but the trend of poor survivals appears to continue for this facility.
- 3) Poor tag retention in fish released from the Cannery Creek hatchery again likely occurred and caused serious problems in estimating hatchery contributions to the catch in the 1996 fishery. Every effort should be made to resolve the tag retention problem.
- 4) The release of large pink salmon fry later in the season produced higher survival rates at both the AFK and WHN hatcheries. Additional study of this release strategy is warranted.

- 5) The remote released sockeye salmon smolt at Coghill lake produced just over 45% of the total return to that system. As in the past, the hatchery produced smolt returned to the Coghill estuary, but did not migrate up the river. This year sufficient wild stock adults were present to reach the escapement goal early enough in the season to allow a common property fishery to occur in the Coghill District while the quality of the fish was still very good. Since few of the remote released sockeye salmon smolt contributed to the escapement they are only a benefit to the fishery when the wild stocks are strong. As an enhancement tool this year's sockeye salmon return was a success, but as a rehabilitation tool the project has yet to prove itself. One more year of significant returns remain from hatchery smolt remote releases. However, three years of returns from presmolt stocked into Coghill lake remain.
- 6) The remote released sockeye salmon at Eshamy Lake did contribute to the common property fishery in the Eshamy and Coghill Districts, but once again failed to migrate up into Eshamy lake with the wild stock run. Because of the late migration time into the lake it is doubtful that any significant contribution was made as a viable spawning population. As with the Coghill remote release, the return was somewhat successful as an enhancement tool, but is doubtful as a rehabilitation project. Only one year class remains to return from this stocking and it is a very small percentage of the total release. As far as management purposes are concerned the Eshamy hatchery remote release production is complete.
- 7) The survivals of the brood year 1991 sockeye salmon releases at Main Bay hatchery were poor when compared to other years. This poor survival may be a result of exposure to the IHN virus that occurred at the hatchery in some stocks that year. The survivals from the 1992 brood year releases have already exceeded those of 1991 with one more year class to return.

Table 1

1995 Pink Salmon Releases by Tag Code

SPECIES	HATCHERY	RELYR	BDYR	RELEASE SITE	TAG CODE	BEG REL	END REL	REL WT	EXPERIMENT	TAGGED	RELEASED	TAG RATIO
PINK	A F KOERNIG	1995	1994	SAWMILL BAY 226-40	1301030112	05/04/95	05/04/95	0.22	TIME OF RELEASE	10,805	6,482,867	599.987
PINK	A F KOERNIG	1995	1994	SAWMILL BAY 226-40	1301030208	06/14/95	06/14/95	0.68	TIME OF RELEASE	5,484	3,290,381	599.996
PINK	A F KOERNIG	1995	1994	SAWMILL BAY 226-40	1301030611	06/15/95	06/15/95	1.35	SIZE AT RELEASE	4,949	2,961,191	598.341
PINK	A F KOERNIG	1995	1994	SAWMILL BAY 226-40	1301030612	06/15/95	06/15/95	1.34	SIZE AT RELEASE	5,056	3,024,130	598.126
PINK	A F KOERNIG	1995	1994	SAWMILL BAY 226-40	1301030613	04/25/95	04/25/95	0.3	TIME OF RELEASE	12,844	7,706,875	600.036
PINK	A F KOERNIG	1995	1994	SAWMILL BAY 226-40	1301030614	04/28/95	04/28/95	0.26	TIME OF RELEASE	13,227	7,935,957	599.981
PINK	A F KOERNIG	1995	1994	SAWMILL BAY 226-40	1301030615	05/01/95	05/01/95	0.27	TIME OF RELEASE	13,150	7,890,002	600
PINK	A F KOERNIG	1995	1994	SAWMILL BAY 226-40	1301030701	05/02/95	05/02/95	0.24	TIME OF RELEASE	13,267	7,959,660	599.959
PINK	A F KOERNIG	1995	1994	SAWMILL BAY 226-40	1301030702	05/03/95	05/03/95	0.27	TIME OF RELEASE	11,523	6,914,076	600.023
PINK	A F KOERNIG	1995	1994	SAWMILL BAY 226-40	1301030703	05/04/95	05/04/95	0.26	TIME OF RELEASE	11,489	6,893,169	599.979
PINK	A F KOERNIG	1995	1994	SAWMILL BAY 226-40	1301030704	05/05/95	05/05/95	0.25	TIME OF RELEASE	11,568	6,940,882	600.007
PINK	A F KOERNIG	1995	1994	SAWMILL BAY 226-40	1301030705	05/06/95	05/06/95	0.21	TIME OF RELEASE	11,971	7,182,752	600.012
PINK	A F KOERNIG	1995	1994	SAWMILL BAY 226-40	1301030706	05/08/95	05/08/95	0.22	TIME OF RELEASE	11,497	6,898,064	599.988
PINK	A F KOERNIG	1995	1994	SAWMILL BAY 226-40	1301030707	05/08/95	05/08/95	0.23	TIME OF RELEASE	11,596	6,884,266	593.675
PINK	A F KOERNIG	1995	1994	SAWMILL BAY 226-40	1301030708	05/10/95	05/10/95	0.23	TIME OF RELEASE	10,712	6,427,763	600.052
PINK	A F KOERNIG	1995	1994	SAWMILL BAY 226-40	1301030709	05/11/95	05/11/95	0.22	TIME OF RELEASE	10,362	6,217,053	599.985
PINK	A F KOERNIG	1995	1994	SAWMILL BAY 226-40	1301030710	05/02/95	05/02/95	0.22	TIME OF RELEASE	11,624	6,974,024	599.967
PINK	CANNERY CREEK	1995	1994	CANNERY CREEK 222-50	1301030903	04/29/95	04/29/95	0.27	TIME OF RELEASE	15,972	9,557,693	598.403
PINK	CANNERY CREEK	1995	1994	CANNERY CREEK 222-50	1301030904	05/01/95	05/01/95	0.24	TIME OF RELEASE	16,382	9,791,611	597.705
PINK	CANNERY CREEK	1995	1994	CANNERY CREEK 222-50	1301030905	05/03/95	05/03/95	0.24	TIME OF RELEASE	16,244	9,699,256	597.097
PINK	CANNERY CREEK	1995	1994	CANNERY CREEK 222-50	1301030906	05/06/95	05/06/95	0.24	TIME OF RELEASE	16,740	10,028,649	599.082
PINK	CANNERY CREEK	1995	1994	CANNERY CREEK 222-50	1301030907	05/09/95	05/09/95	0.26	TIME OF RELEASE	16,366	9,833,723	600.862
PINK	CANNERY CREEK	1995	1994	CANNERY CREEK 222-50	1301030908	05/15/95	05/15/95	0.27	TIME OF RELEASE	16,661	9,865,363	592.123
PINK	CANNERY CREEK	1995	1994	CANNERY CREEK 222-50	1301030909	05/22/95	05/22/95	0.29	TIME OF RELEASE	16,345	9,827,507	601.254
PINK	CANNERY CREEK	1995	1994	CANNERY CREEK 222-50	1301030910	05/22/95	05/22/95	0.28	TIME OF RELEASE	16,785	10,026,368	597.34
PINK	CANNERY CREEK	1995	1994	CANNERY CREEK 222-50	1301030911	05/27/95	05/27/95	0.31	TIME OF RELEASE	16,480	9,884,051	598.546
PINK	CANNERY CREEK	1995	1994	CANNERY CREEK 222-50	1301030912	05/27/95	05/27/95	0.27	TIME OF RELEASE	16,394	9,831,138	599.679
PINK	CANNERY CREEK	1995	1994	CANNERY CREEK 222-50	1301030913	05/30/95	05/30/95	0.27	TIME OF RELEASE	16,668	10,101,033	606.013
PINK	CANNERY CREEK	1995	1994	CANNERY CREEK 222-50	1301030914	05/30/95	05/30/95	0.27	TIME OF RELEASE	16,247	9,765,141	601.042
PINK	CANNERY CREEK	1995	1994	CANNERY CREEK 222-50	1301030915	06/01/95	06/01/95	0.27	TIME OF RELEASE	16,094	9,610,718	597.161
PINK	CANNERY CREEK	1995	1994	CANNERY CREEK 222-50	1301031001	06/01/95	06/01/95	0.24	TIME OF RELEASE	4,176	2,537,200	607.567
PINK	SOLOMON GULCH	1995	1994	SOLOMON GULCH 221-60	1301030602	05/02/95	05/02/95	0.35	NONE	38,238	24,064,548	629.335
PINK	SOLOMON GULCH	1995	1994	SOLOMON GULCH 221-60	1301030603	05/02/95	05/02/95	0.34	NONE	41,773	25,360,456	607.101
PINK	SOLOMON GULCH	1995	1994	SOLOMON GULCH 221-60	1301030604	05/02/95	05/02/95	0.36	NONE	42,204	25,937,816	614.581
PINK	SOLOMON GULCH	1995	1994	SOLOMON GULCH 221-60	1301030605	05/05/95	05/05/95	0.31	NONE	44,606	26,999,046	605.278
PINK	SOLOMON GULCH	1995	1994	SOLOMON GULCH 221-60	1301030606	05/05/95	05/05/95	0.33	NONE	45,160	27,148,395	601.16
PINK	SOLOMON GULCH	1995	1994	SOLOMON GULCH 221-60	1301030607	05/05/95	05/05/95	0.29	NONE	40,824	24,333,581	596.06
PINK	SOLOMON GULCH	1995	1994	SOLOMON GULCH 221-60	1301030608	05/02/95	05/02/95	0.37	NONE	52,218	31,917,113	611.228
PINK	SOLOMON GULCH	1995	1994	SOLOMON GULCH 221-60	1301030609	05/05/95	05/05/95	0.32	NONE	32,811	19,610,175	597.67
PINK	WALLY NOERENBERG	1995	1994	LAKE BAY 223-40	1301030412	04/29/95	04/29/95	0.35	TIME OF RELEASE	18,306	11,204,511	612.067
PINK	WALLY NOERENBERG	1995	1994	LAKE BAY 223-40	1301030413	04/29/95	04/29/95	0.31	TIME OF RELEASE	19,685	11,784,356	598.646
PINK	WALLY NOERENBERG	1995	1994	LAKE BAY 223-40	1301030414	05/01/95	05/01/95	0.27	TIME OF RELEASE	19,554	11,835,217	605.258
PINK	WALLY NOERENBERG	1995	1994	LAKE BAY 223-40	1301030415	05/01/95	05/01/95	0.28	TIME OF RELEASE	19,626	11,858,128	604.205
PINK	WALLY NOERENBERG	1995	1994	LAKE BAY 223-40	1301030501	05/03/95	05/03/95	0.26	TIME OF RELEASE	19,655	11,965,054	608.753
PINK	WALLY NOERENBERG	1995	1994	LAKE BAY 223-40	1301030502	05/03/95	05/03/95	0.25	TIME OF RELEASE	19,615	11,910,616	607.219
PINK	WALLY NOERENBERG	1995	1994	LAKE BAY 223-40	1301030503	05/05/95	05/05/95	0.22	TIME OF RELEASE	21,607	12,939,147	598.84
PINK	WALLY NOERENBERG	1995	1994	LAKE BAY 223-40	1301030504	05/05/95	05/05/95	0.26	TIME OF RELEASE	20,170	12,045,477	597.197
PINK	WALLY NOERENBERG	1995	1994	LAKE BAY 223-40	1301030505	05/07/95	05/07/95	0.25	TIME OF RELEASE	20,192	12,055,098	597.023
PINK	WALLY NOERENBERG	1995	1994	LAKE BAY 223-40	1301030506	05/07/95	05/07/95	0.24	TIME OF RELEASE	20,258	12,094,688	597.032
PINK	WALLY NOERENBERG	1995	1994	LAKE BAY 223-40	1301030507	05/13/95	05/13/95	0.26	TIME OF RELEASE	19,983	12,032,630	602.143
PINK	WALLY NOERENBERG	1995	1994	LAKE BAY 223-40	1301030508	05/13/95	05/13/95	0.26	TIME OF RELEASE	20,160	12,041,789	597.31
PINK	WALLY NOERENBERG	1995	1994	LAKE BAY 223-40	1301030509	05/22/95	05/22/95	0.27	TIME OF RELEASE	20,152	12,058,282	598.366
PINK	WALLY NOERENBERG	1995	1994	LAKE BAY 223-40	1301030510	05/22/95	05/22/95	0.24	TIME OF RELEASE	11,518	6,723,354	583.725
PINK	WALLY NOERENBERG	1995	1994	LAKE BAY 223-40	1301030511	06/15/95	06/15/95	1.06	SIZE AT RELEASE	5,443	3,153,255	579.322
PINK	WALLY NOERENBERG	1995	1994	LAKE BAY 223-40	1301030512	06/15/95	06/15/95	0.95	SIZE AT RELEASE	5,346	3,162,934	591.644

Table 2

## 1996 Pink Salmon Releases by Tag Code

SPECIES	HATCHERY	RELYR	BDYR	RELSITE	TAG CODE	BEG REL	END REL	REL Wt	EXPERIMENT	TAGGED	RELEASED	TAG RATIO
PINK	A F KOERNIG	1996	1995	SAWMILL BAY 228-40	1301031315	05/11/96	05/11/96	0.66	REARING STRATEGY	17,818	10,768,841	604.38
PINK	A F KOERNIG	1996	1995	SAWMILL BAY 228-40	1301031401	05/11/96	05/11/96	0.52	REARING STRATEGY	16,976	10,374,384	611.121
PINK	A F KOERNIG	1996	1995	SAWMILL BAY 228-40	1301031402	05/11/96	05/11/96	0.48	REARING STRATEGY	17,090	10,325,538	604.186
PINK	A F KOERNIG	1996	1995	SAWMILL BAY 228-40	1301031403	05/11/96	05/11/96	0.4	REARING STRATEGY	18,284	10,912,648	596.841
PINK	A F KOERNIG	1996	1995	SAWMILL BAY 228-40	1301031404	05/11/96	05/11/96	0.38	REARING STRATEGY	18,130	10,628,167	586.111
PINK	A F KOERNIG	1996	1995	SAWMILL BAY 228-40	1301031405	05/24/96	05/24/96	0.56	REARING STRATEGY	14,476	8,312,086	574.198
PINK	A F KOERNIG	1996	1995	SAWMILL BAY 228-40	1301031406	05/24/96	05/24/96	0.52	REARING STRATEGY	15,080	8,638,583	572.85
PINK	A F KOERNIG	1996	1995	SAWMILL BAY 228-40	1301031407	05/24/96	05/24/96	0.47	REARING STRATEGY	14,990	8,594,441	573.345
PINK	A F KOERNIG	1996	1995	SAWMILL BAY 228-40	1301031408	05/24/96	05/24/96	0.47	REARING STRATEGY	15,855	9,745,337	614.654
PINK	A F KOERNIG	1996	1995	SAWMILL BAY 228-40	1301031409	05/24/96	05/24/96	0.24	REARING STRATEGY	13,319	7,877,679	591.462
PINK	A F KOERNIG	1996	1995	SAWMILL BAY 228-40	1301031410	05/24/96	05/24/96	0.71	REARING STRATEGY	6,857	4,088,687	598.279
PINK	A F KOERNIG	1996	1995	SAWMILL BAY 228-40	1301031411	05/24/96	05/24/96	0.61	REARING STRATEGY	6,955	4,150,370	596.746
PINK	A F KOERNIG	1996	1995	SAWMILL BAY 228-40	1301031412	05/24/96	05/24/96	0.79	REARING STRATEGY	7,288	4,222,195	580.929
PINK	CANNERY CREEK	1996	1995	CANNERY CR 222-50	1301030413	05/07/96	05/07/96	0.31	TIME OF RELEASE	16,025	9,615,650	600.041
PINK	CANNERY CREEK	1996	1995	CANNERY CR 222-50	1301030414	05/07/96	05/07/96	0.27	TIME OF RELEASE	16,557	9,934,444	600.015
PINK	CANNERY CREEK	1996	1995	CANNERY CR 222-50	1301030415	05/12/96	05/12/96	0.28	TIME OF RELEASE	16,619	9,971,524	600.007
PINK	CANNERY CREEK	1996	1995	CANNERY CR 222-50	1301030501	05/15/96	05/15/96	0.27	TIME OF RELEASE	16,832	9,978,551	599.961
PINK	CANNERY CREEK	1996	1995	CANNERY CR 222-50	1301030502	05/16/96	05/16/96	0.26	TIME OF RELEASE	16,623	9,973,804	600
PINK	CANNERY CREEK	1996	1995	CANNERY CR 222-50	1301030503	05/22/96	05/22/96	0.27	TIME OF RELEASE	16,628	10,291,792	618.943
PINK	CANNERY CREEK	1996	1995	CANNERY CR 222-50	1301030504	05/22/96	05/22/96	0.28	TIME OF RELEASE	16,633	10,764,088	647.152
PINK	CANNERY CREEK	1996	1995	CANNERY CR 222-50	1301030505	05/22/96	05/22/96	0.27	TIME OF RELEASE	16,983	10,703,108	630.225
PINK	CANNERY CREEK	1996	1995	CANNERY CR 222-50	1301030506	05/22/96	05/22/96	0.29	TIME OF RELEASE	16,837	10,979,642	659.953
PINK	CANNERY CREEK	1996	1995	CANNERY CR 222-50	1301030507	05/24/96	05/24/96	0.29	TIME OF RELEASE	16,630	11,213,439	674.29
PINK	CANNERY CREEK	1996	1995	CANNERY CR 222-50	1301030508	05/24/96	05/24/96	0.26	TIME OF RELEASE	15,230	10,232,285	671.851
PINK	CANNERY CREEK	1996	1995	CANNERY CR 222-50	1301030509	05/28/96	05/28/96	0.29	TIME OF RELEASE	16,783	11,018,655	656.537
PINK	CANNERY CREEK	1996	1995	CANNERY CR 222-50	1301030510	05/28/96	05/28/96	0.29	TIME OF RELEASE	16,629	9,978,652	600.075
PINK	CANNERY CREEK	1996	1995	CANNERY CR 222-50	1301030511	05/28/96	05/28/96	0.24	TIME OF RELEASE	9,842	5,785,499	600.031
PINK	SOLOMON GULCH	1996	1995	SOLOMON GULCH 221-80	1301031113	05/07/96	05/07/96	0.34	NONE	53,278	31,830,481	597.441
PINK	SOLOMON GULCH	1996	1995	SOLOMON GULCH 221-80	1301031114	05/28/96	05/28/96	0.34	NONE	53,562	31,989,818	597.248
PINK	SOLOMON GULCH	1996	1995	SOLOMON GULCH 221-80	1301031115	05/28/96	05/28/96	0.34	NONE	136,066	80,464,628	591.278
PINK	SOLOMON GULCH	1996	1995	SOLOMON GULCH 221-80	1301031201	05/07/96	05/28/96	0.66	NONE	133,277	78,803,400	591.275
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031202	08/02/96	08/02/96	1.29	TIME OF RELEASE	4,958	2,851,883	612.067
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031203	08/02/96	08/02/96	1.36	TIME OF RELEASE	5,052	2,996,758	593.183
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031204	08/02/96	08/02/96	1.06	TIME OF RELEASE	4,731	2,850,133	602.438
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031205	08/01/96	08/01/96	0.81	TIME OF RELEASE	4,945	2,689,583	543.899
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031206	05/03/96	05/03/96	0.37	TIME OF RELEASE	12,277	7,148,802	582.128
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031207	05/03/96	05/03/96	0.36	TIME OF RELEASE	11,711	7,131,155	608.928
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031208	05/03/96	05/03/96	0.49	TIME OF RELEASE	12,372	6,768,978	547.121
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031209	05/03/96	05/03/96	0.28	TIME OF RELEASE	11,649	6,958,899	597.382
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031210	05/03/96	05/03/96	0.29	TIME OF RELEASE	11,758	7,086,362	602.939
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031211	05/03/96	05/03/96	0.28	TIME OF RELEASE	11,677	7,010,355	600.356
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031212	05/03/96	05/03/96	0.29	TIME OF RELEASE	11,247	6,737,466	599.046
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031213	05/03/96	05/03/96	0.3	TIME OF RELEASE	11,863	7,093,496	582.128
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031214	05/03/96	05/03/96	0.28	TIME OF RELEASE	10,748	6,400,600	582.126
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031215	05/03/96	05/03/96	0.3	TIME OF RELEASE	11,674	6,922,926	582.129
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031215	05/03/96	05/03/96	0.3	TIME OF RELEASE	11,674	6,922,926	582.129
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031301	05/03/96	05/03/96	0.29	TIME OF RELEASE	12,664	7,585,848	599.009
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031302	05/03/96	05/03/96	0.27	TIME OF RELEASE	12,115	7,173,971	592.156
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031303	05/03/96	05/03/96	0.3	TIME OF RELEASE	12,280	7,227,585	589.526
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031304	05/03/96	05/03/96	0.27	TIME OF RELEASE	12,361	7,320,086	592.192
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031305	05/03/96	05/03/96	0.28	TIME OF RELEASE	12,314	7,304,017	593.147
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031306	05/03/96	05/03/96	0.28	TIME OF RELEASE	12,305	7,310,728	594.126
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031307	05/03/96	05/03/96	0.26	TIME OF RELEASE	11,972	7,342,976	613.346
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031308	05/03/96	05/03/96	0.27	TIME OF RELEASE	12,257	7,372,255	601.473
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031309	05/09/96	05/09/96	0.29	TIME OF RELEASE	12,132	7,288,100	600.734
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031310	05/09/96	05/09/96	0.29	TIME OF RELEASE	12,374	7,998,210	646.372
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031311	05/09/96	05/09/96	0.27	TIME OF RELEASE	12,625	7,757,000	614.416
PINK	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031312	05/09/96	05/09/96	0.25	TIME OF RELEASE	12,087	7,179,817	594.011

Table 3

1996 Other Salmon Releases by Tag Code

SPECIES	HATCHERY	RELYR	BDYR	RELEASE SITE	TAG CODE	BEG REL	END REL	REL WT	EXPERIMENT	TAGGED	RELEASED	TAG RATIO
SOCKEYE	(M) GULKANA	1996	1994	SUMMIT LK 212-20	312462	06/04/96	06/08/96	5.48	NONE	10,395	165,310	15.903
SOCKEYE	(M) GULKANA	1996	1994	SUMMIT LK 212-20	312529	06/09/96	07/02/96	5.72	NONE	11,418	173,708	15.214
SOCKEYE	(M) GULKANA	1996	1994	SUMMIT LK 212-20	312530	07/09/96	07/10/96	6.5	NONE	3,200	34,685	10.839
SOCKEYE	GULKANA	1996	1994	CROSSWIND LK 212-20	312457	06/03/96	06/06/96	7.68	COLONIZATION	10,467	265,389	25.354
SOCKEYE	GULKANA	1996	1994	CROSSWIND LK 212-20	312518	06/14/96	06/18/96	8.66	COLONIZATION	27,070	34,442	1.272
SOCKEYE	GULKANA	1996	1994	CROSSWIND LK 212-20	312522	06/18/96	06/20/96	7.68	COLONIZATION	14,007	23,585	1.684
SOCKEYE	GULKANA	1996	1994	CROSSWIND LK 212-20	312524	06/06/96	06/08/96	7.7	COLONIZATION	11,786	628,525	53.328
SOCKEYE	GULKANA	1996	1994	CROSSWIND LK 212-20	312525	06/08/96	06/10/96	7.93	COLONIZATION	11,520	580,651	50.404
SOCKEYE	GULKANA	1996	1994	CROSSWIND LK 212-20	312526	06/10/96	06/11/96	7.44	COLONIZATION	11,558	52,954	4.582
SOCKEYE	GULKANA	1996	1994	CROSSWIND LK 212-20	312527	06/11/96	06/12/96	8.03	COLONIZATION	11,233	47,987	4.272
SOCKEYE	GULKANA	1996	1994	CROSSWIND LK 212-20	312528	06/13/96	06/14/96	8.03	COLONIZATION	11,516	15,153	1.316
SOCKEYE	GULKANA	1996	1994	CROSSWIND LK 212-20	312609	06/22/96	06/22/96	9.14	COLONIZATION	1,455	9,398	6.459
CHUM	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031009	05/20/96	05/20/96	0.43	TIME OF RELEASE	12,198	5,897,210	483.457
CHUM	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031010	05/20/96	05/20/96	0.4	TIME OF RELEASE	12,428	6,053,896	487.117
CHUM	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031011	05/29/96	05/29/96	0.36	TIME OF RELEASE	12,474	6,094,466	488.574
CHUM	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031012	05/20/96	05/20/96	0.38	TIME OF RELEASE	12,820	6,086,274	474.748
CHUM	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031013	05/29/96	05/29/96	0.4	TIME OF RELEASE	12,765	6,052,868	474.177
CHUM	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031014	05/29/96	05/29/96	0.37	TIME OF RELEASE	13,223	6,175,184	467.003
CHUM	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031015	05/29/96	05/29/96	0.36	TIME OF RELEASE	12,649	6,175,730	488.239
CHUM	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031101	05/29/96	05/29/96	0.36	TIME OF RELEASE	12,592	6,193,078	491.826
CHUM	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031106	06/02/96	06/02/96	0.58	TIME OF RELEASE	12,585	6,048,352	480.6
CHUM	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031107	06/02/96	06/02/96	0.56	TIME OF RELEASE	12,835	5,945,014	463.188
CHUM	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031108	06/02/96	06/02/96	0.49	TIME OF RELEASE	12,091	5,990,606	495.46
CHUM	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031109	06/02/96	06/02/96	0.43	TIME OF RELEASE	3,487	1,740,231	499.063
CHUM	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031110	05/20/96	05/20/96	0.46	TIME OF RELEASE	8,091	3,953,252	488.599
CHUM	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031111	05/20/96	05/20/96	0.43	TIME OF RELEASE	8,223	4,186,910	509.174
CHUM	WALLY NOERENBERG	1996	1995	LAKE BAY 223-40	1301031112	05/20/96	05/20/96	0.38	TIME OF RELEASE	8,535	3,971,575	465.328
CHUM	WALLY NOERENBERG	1996	1995	PT CHALMERS 227-20	1301031102	05/25/96	05/25/96	0.36	REMOTE RELEASE	12,602	6,195,818	491.654
CHUM	WALLY NOERENBERG	1996	1995	PT CHALMERS 227-20	1301031103	05/25/96	05/25/96	0.35	REMOTE RELEASE	12,955	6,253,136	482.681
CHUM	WALLY NOERENBERG	1996	1995	PT CHALMERS 227-20	1301031104	05/28/96	05/28/96	0.36	REMOTE RELEASE	12,938	6,201,565	479.329
CHUM	WALLY NOERENBERG	1996	1995	PT CHALMERS 227-20	1301031105	05/28/96	05/28/96	0.41	REMOTE RELEASE	12,703	6,068,912	477.754
COHO	WALLY NOERENBERG	1996	1994	LAKE BAY 223-40	312533	05/05/96	06/05/96	12.62	REARING STRATEGY	4,988	92,191	18.483
COHO	WALLY NOERENBERG	1996	1994	LAKE BAY 223-40	312534	06/05/96	06/05/96	20.98	REARING STRATEGY	5,018	71,253	14.199

Table 4

Hatchery Survival Rate by Tag Code 1/

Hatchery	Tag Code	Survival Rate	Std. Error	95 % Lower Confidence	95% Upper Confidence
A. F. Koemig	1301030112	0.006	0.0022745	0.002	0.011
	1301030208	0.009	0.0036391	0.001	0.016
	1301030611	0.038	0.0085060	0.021	0.055
	1301030612	0.034	0.0085819	0.017	0.051
	1301030613	0.014	0.0046342	0.005	0.023
	1301030614	0.018	0.0049829	0.008	0.028
	1301030615	0.025	0.0052863	0.015	0.036
	1301030701	0.019	0.0042169	0.011	0.027
	1301030702	0.030	0.0059691	0.018	0.041
	1301030703	0.018	0.0036209	0.011	0.026
	1301030704	0.018	0.0040807	0.010	0.026
	1301030705	0.018	0.0052896	0.008	0.029
	1301030706	0.014	0.0032456	0.008	0.020
	1301030707	0.020	0.0038549	0.013	0.028
	1301030708	0.020	0.0056745	0.008	0.031
	1301030709	0.015	0.0038078	0.007	0.022
	1301030710	0.007	0.0024189	0.002	0.012
Cannery Creek	1301030903	0.050	0.0090546	0.032	0.068
	1301030904	0.039	0.0062659	0.027	0.051
	1301030905	0.025	0.0050837	0.016	0.035
	1301030906	0.024	0.0047859	0.015	0.033
	1301030907	0.027	0.0051913	0.017	0.037
	1301030908	0.027	0.0043140	0.019	0.036
	1301030909	0.062	0.0074794	0.048	0.077
	1301030910	0.044	0.0057997	0.033	0.056
	1301030911	0.056	0.0076443	0.041	0.071
	1301030912	0.040	0.0054729	0.029	0.050
	1301030913	0.031	0.0052137	0.021	0.041
	1301030914	0.031	0.0054885	0.021	0.042
	1301030915	0.016	0.0037179	0.009	0.023
	1301031001	0.019	0.0079229	0.003	0.034
Solomon Gulch	1301030602	0.034	0.0030904	0.028	0.041
	1301030603	0.042	0.0029394	0.036	0.047
	1301030604	0.039	0.0033460	0.033	0.046
	1301030605	0.026	0.0022267	0.022	0.031
	1301030606	0.032	0.0028216	0.026	0.037
	1301030607	0.024	0.0026133	0.019	0.029
	1301030608	0.051	0.0030113	0.045	0.057
	1301030609	0.027	0.0025912	0.022	0.032
Wally Noerenberg	1301030412	0.038	0.0060019	0.026	0.049
	1301030413	0.043	0.0062631	0.031	0.055
	1301030414	0.036	0.0060846	0.024	0.048
	1301030415	0.038	0.0058995	0.026	0.050
	1301030501	0.024	0.0042445	0.015	0.032
	1301030502	0.023	0.0048346	0.014	0.033
	1301030503	0.018	0.0038458	0.011	0.026
	1301030504	0.022	0.0044906	0.014	0.031
	1301030505	0.025	0.0045061	0.016	0.033
	1301030506	0.031	0.0051503	0.021	0.041
	1301030507	0.034	0.0053771	0.024	0.045
	1301030508	0.037	0.0055339	0.026	0.047
	1301030509	0.041	0.0061075	0.029	0.053
	1301030510	0.026	0.0054750	0.015	0.037
	1301030511	0.081	0.0172991	0.047	0.115
	1301030512	0.070	0.0146867	0.041	0.099

1/ Numbers are not adjusted for the Cannery Creek hatchery high tag loss rate

Table 5

Hatchery Contribution to Pink Salmon Common Property Fishery (X1000)

## Coghill District Common Property

Period	Date	AFK Hatchery		WN Hatchery		CC Hatchery		SG Hatchery		TOTAL HATCHERY		TOTAL WILD	TOTAL CATCH	NUMBER TAGS
		Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage			
1 1/	06/10									0	0		0.0	0
2	6/12 - 6/13									0	0		0.0	0
3 2/	6/15 - 6/16									0	0		0.0	0
4	6/17 - 6/18									0	0		0.0	0
5	6/19 - 6/20									0	0	0.0	0.0	0
6 3/	6/21 - 6/22									0	0	0.0	0.0	0
7 3/	6/23 - 6/25									0	0	0.1	0.1	0
8 3/	6/27 - 6/29									0	0	0.4	0.4	0
9 3/	7/01 - 7/02									0	0	0.1	0.1	0
10 3/	7/04 - 7/06									0	0	1.0	1.0	0
11 3/	7/08 - 7/09									0	0	1.1	1.1	0
12 3/	7/11 - 7/13									0	0	1.1	1.1	0
13 3/	7/14 - 7/16									0	0	4.6	4.6	0
14 3/	7/17 - 7/18									0	0	4.3	4.3	0
15 3/	7/20 - 7/22									0	0	2.4	2.4	0
16 4/	7/23 - 7/27	0.3	2	12.0	96	0.3	2			12.5	100	0.0	12.5	0
17 4/	7/29 - 8/03	0.0	2	1.8	96	0.0	2			1.9	100	0.0	1.9	0
18 GN, 17 PS	08/04	2.5	2	113.9	96	2.5	2			118.9	100	0.0	118.9	47
19 GN, 18 PS	08/06			179.8	59	55.4	18			235.3	77	70.9	306.1	55
20 GN, 19 PS	08/08			257.6	72	58.2	16			315.8	88	42.8	358.6	36
21 GN, 20 PS	08/14			482.9	75	48.3	8			531.2	83	110.3	641.5	38
22 GN, 21 PS	08/22			52.0	83	10.4	17			62.3	100	0.0	62.3	8
23 GN 5/	8/29 - 8/30			5.4	83	1.1	17			6.5	100	0.0	6.5	0
24 GN, 22 PS 5/	9/02 - 9/04			10.6	83	2.1	17			12.8	100	0.0	12.8	0
25 GN, 23 PS 5/	9/05 - 9/07			5.5	83	1.1	17			6.6	100	0.0	6.6	0
26 GN, 24 PS 5/	9/09 - 9/11			0.8	83	0.2	17			0.9	100	0.0	0.9	0
27 GN 5/	9/12 - 9/14			0.1	83	0.0	17			0.1	100	0.0	0.1	0
Total		2.8	0	1,122.4	73	179.8	12	0	0	1,304.8	85	239.1	1,543.9	182

GN equals 'gillnet' and PS equals 'purse seine'

- 1/ Proportions from period 2 were used to estimate hatchery contributions  
 2/ Proportions from period 4 were used to estimate hatchery contributions  
 3/ Proportions from period 5 were used to estimate hatchery contributions  
 4/ Proportions from period 18 Gillnet, 17 Purse Seine were used to estimate hatchery contributions  
 5/ Proportions from period 22 Gillnet, 21 Purse Seine were used to estimate hatchery contributions

Continued

Table 5

## Hatchery Contribution to Pink Salmon Common Property Fishery (X1000)

## Eshamy District Common Property

Period	Date	AFK Hatchery		WN Hatchery		CC Hatchery		SG Hatchery		TOTAL HATCHERY		TOTAL WILD	TOTAL CATCH	NUMBER TAGS
		Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage			
1	7/01 - 7/02									0.0		2.6	2.6	0
2	7/04 - 7/05									0.0		3.9	3.9	0
3	7/08 - 7/09									0.0		3.7	3.7	0
4	7/11 - 7/13									0.0		2.2	2.2	0
5	7/15 - 7/17									0.0		3.8	3.8	0
6	7/18 - 7/20									0.0		4.3	4.3	0
7	7/22 - 7/24									0.0		1.7	1.7	0
8 1/	7/25 - 7/27	0.0	2	2.2	96	0.0	2			2.3	100	0.0	2.3	0
9 1/	7/29 - 7/31	0.1	2	4.7	96	0.1	2			4.9	100	0.0	4.9	0
10 2/	8/01 - 8/02			1.7	59	0.5	18			2.2	77	0.6	2.8	0
11 3/	8/05 - 8/06			2.4	72	0.4	16			2.8	88	0.6	3.4	0
Total		0.1	0	11.0	31	1.0	3	0	0	12.2	34	23.5	35.7	0

1/ Proportions from period 18 Gillnet, 17 Purse Seine of the Coghill District Common Property fishery were used to estimate hatchery contributions

2/ Proportions from period 19 Gillnet, 18 Purse Seine of the Coghill District Common Property fishery were used to estimate hatchery contributions

3/ Proportions from period 20 Gillnet, 19 Purse Seine of the Coghill District Common Property fishery were used to estimate hatchery contributions



Table 5

## Hatchery Contribution to Pink Salmon Common Property Fishery (X1000)

Northern District Common Property 3/

Period	Date	AFK Hatchery		WN Hatchery		CC Hatchery		SG Hatchery		TOTAL HATCHERY		TOTAL WILD	TOTAL CATCH	NUMBER TAGS
		Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage			
8 1/	7/17 - 7/19					0.9	28			0.9	28	2.3	3.2	0
10	07/21					12.9	28			12.9	28	32.5	45.4	1
11 1/	07/23					5.4	28			5.4	28	13.6	19.0	0
12	07/25					6.3	19			6.3	19	26.0	32.3	1
13	07/27					23.5	64			23.5	64	18.2	41.7	8
14	07/29			2.8	4	39.9	64	2.1	3	44.8	71	24.8	69.5	19
15	07/31					96.4	76	3.4	3	99.8	79	31.3	131.1	28
16	08/02					186.3	84			186.3	84	56.5	242.9	23
17	08/04			30.4	9	260.5	82			290.9	92	26.0	316.9	49
18	08/06			22.1	3	663.6	82			685.7	85	102.6	788.4	104
19	08/08			35.0	6	470.1	77			505.2	82	114.2	619.4	78
20	08/11			57.4	13	296.4	69	6.1	1	359.9	84	76.1	436.0	64
21	08/14			66.6	18	311.8	82			378.3	100	0.0	378.3	34
22	08/16	11.4	4	46.3	16	185.9	68			243.6	88	38.7	282.3	48
23	08/17	4.6	1	135.1	27	206.8	44			346.5	72	133.5	480.0	85
24	08/18	9.6	3	60.3	20	192.5	65			262.4	88	39.5	301.9	58
25	08/20	5.9	1	47.8	12	249.0	64			302.8	77	104.6	407.4	49
26	08/21			18.6	13	53.4	36			72.0	49	76.4	148.4	8
27	8/22 - 8/23			4.7	5	70.1	83			74.7	88	15.4	90.1	17
28	8/24 - 8/26					58.6	69			58.6	69	26.5	85.1	9
29 2/	8/27 - 8/31					86.6	69			86.6	69	39.2	125.8	0
Total		31.5	1	527.3	10	3,476.9	69	11.5	0	4,047.2	80	997.9	5,045.1	683

1/ Proportions from period 10 were used to estimate hatchery contributions

2/ Proportions from period 28 were used to estimate hatchery contributions

3/ ADJUSTED: Excess adipose clips without tags used in calculating Cannery Creek hatchery contributions.

Continued

Table 5

## Hatchery Contribution to Pink Salmon Common Property Fishery (X1000)

## Southwestern District Common Property 2/

Period	Date	AFK Hatchery		WN Hatchery		CC Hatchery		SG Hatchery		TOTAL HATCHERY		TOTAL WILD	TOTAL CATCH	NUMBER TAGS
		Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage			
11	1/ 7/23 - 7/24	0.6	35	0.2	10	0.9	55			1.7	100	0.0	1.7	0
12	07/25	9.9	35	2.7	10	15.4	55			28.0	100	0.0	28.0	9
13	07/27	3.9	5	10.1	13	27.6	35			41.6	53	36.5	78.1	10
14	07/29	32.0	13	41.6	16	116.3	52	18.7	8	208.5	89	34.6	243.1	55
15	07/31	78.1	29	53.4	20	66.7	26	3.4	1	201.5	76	62.8	264.3	41
16	08/02	116.4	28	67.4	16	145.9	41	6.4	1	336.1	87	56.8	392.9	99
17	08/04	124.4	27	148.8	32	110.3	30	8.1	2	391.6	91	45.3	436.9	68
18	08/06	70.1	23	35.6	12	69.6	26			175.3	62	123.5	298.8	41
19	08/08	85.9	23	42.9	12	122.6	33			251.4	67	121.3	372.8	31
20	8/10 - 8/14	559.9	34	441.0	27	403.7	31			1,404.6	93	131.5	1,536.1	255
21	8/15 - 8/16	179.8	43	91.8	22	130.1	31			401.7	97	13.2	414.9	62
22	8/17 - 8/19	185.7	61	11.3	4	61.3	24			258.4	89	44.4	302.8	48
23	8/20 - 8/21	38.1	21	11.5	6	78.9	47			128.6	75	50.2	178.8	20
24	8/22 - 8/23	92.9	46			77.4	46			170.3	92	31.8	202.1	12
25	8/24 - 8/26	103.5	57	7.1	4	60.8	39			171.4	100	0.0	171.4	51
26	8/27 - 8/31	47.3	36			76.8	64			124.1	100	0.0	124.1	22
Total		1,728.5	34	965.6	19	1,564.3	31	36.5	1	4,294.9	85	752.0	5,046.9	824

1/ Proportions from period 12 were used to estimate hatchery contributions

2/ ADJUSTED: Excess adipose clips without tags used in calculating Cannery Creek hatchery contributions.

Table 5

## Hatchery Contribution to Pink Salmon Common Property Fishery (X1000)

## Eastern District Common Property

Period	Date	AFK Hatchery		WN Hatchery		CC Hatchery		SG Hatchery		TOTAL HATCHERY		TOTAL WILD	TOTAL CATCH	NUMBER TAGS
		Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage			
1	07/02							576.8	86	576.8	86	95.7	672.5	86
2	07/04							488.6	80	488.6	80	125.2	613.7	113
3	07/06							662.2	77	662.2	77	197.8	860.0	134
4	07/08							536.8	80	536.8	80	138.3	675.2	128
5	07/10							512.3	78	512.3	78	147.1	659.4	112
6	07/12							610.8	91	610.8	91	62.3	673.1	114
7	07/14					10.1	2	450.9	73	461.1	75	159.6	620.6	82
8	07/17					3.7	0	694.6	81	698.2	81	163.3	861.5	147
10	07/21							84.3	95	84.3	95	4.4	88.7	3
11	07/23							54.4	69	54.4	69	24.4	78.8	11
12	07/25							42.6	55	42.6	55	34.6	77.2	10
13	07/27							31.3	75	31.3	75	10.3	41.7	6
14	07/29							23.8	53	23.8	53	21.2	45.1	7
15	07/31							9.4	63	9.4	63	5.5	14.9	6
16 1/	08/02							2.0	63	2.0	63	1.2	3.2	0
20	8/10 - 8/14			28.0	44	14.0	22			42.1	66	21.7	63.7	3
21 2/	8/15 - 8/17			3.6	44	1.8	22			5.4	66	2.8	8.2	0
22 2/	8/18 - 8/19			0.7	44	0.3	22			1.0	66	0.5	1.5	0
27 2/	9/01 - 9/04			0.0	44	0.0	22			0.0	66	0.0	0.0	0
Total		0	0	32.3	1	30.0	0	4,780.9	79	4,843.2	80	1,216	6,059.1	962

1/ Portions from period 15 were used to calculate hatchery contribution estimates.

2/ Portions from period 20 were used to calculate hatchery contribution estimates.

Table 6

## Hatchery Contribution to Pink Salmon Cost Recovery Fishery (X1000)

## Coghill District Cost Recovery

Week	Date	AFK Hatchery		WN Hatchery		CC Hatchery		SG Hatchery		TOTAL HATCHERY		TOTAL WILD	TOTAL CATCH	NUMBER TAGS
		Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage			
28 1/	7/07 - 7/13			0.3	33	0.1	7			0.4	40	0.5	0.9	0
30 1/	7/21 - 7/27			2.3	33	0.4	7			2.7	40	4.1	6.8	0
31	7/28 - 8/03			73.8	33	14.7	7			88.5	40	134.5	223.0	6
32	8/04 - 8/10			227.4	36					227.4	36	399.5	626.9	55
33	8/11 - 8/17			754.8	57	123.3	9			878.2	66	441.4	1,319.6	114
34	8/18 - 8/14			478.9	40	12.0	1			490.9	41	695.4	1,186.3	41
35	8/25 - 8/30	4.1	1	469.8	97	4.0	1			477.9	100	0.0	477.9	116
36	9/01 - 9/07			227.1	100					227.1	100	0.0	227.1	57
37	9/08 - 9/14			35.0	76					35.0	76	11.3	46.3	7
Total		4.1	0	2,269.5	55	154.5	4	0	0	2,428.1	59	1,686.8	4,114.9	396

1/ Proportions from week 31 were used to calculate hatchery contribution estimates

Table 6

Hatchery Contribution to Pink Salmon Cost Recovery Fishery (X1000)

## Eshamy District Cost Recovery

Week	Date	AFK Hatchery		WN Hatchery		CC Hatchery		SG Hatchery		TOTAL HATCHERY		TOTAL WILD	TOTAL CATCH	NUMBER TAGS
		Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage			
26	6/23 - 6/29									0	0	0.0	0.0	
27	6/30 - 7/06									0	0	0.0	0.0	
30	7/21 - 7/27									0	0	0.3	0.3	
31	7/28 - 8/03									0	0	0.2	0.2	
33	8/11 - 8/17									0	0	5.5	5.5	
37	9/08 - 9/14	0	0	0	0	0	0	0	0	0	0	0.0	0.0	
Total										0	0	6.0	6.0	0

Continued

Table 6

## Hatchery Contribution to Pink Salmon Cost Recovery Fishery (1000)

## Northern District Cost Recovery 2/

Week	Date	AFK Hatchery		WN Hatchery		CC Hatchery		SG Hatchery		TOTAL HATCHERY		TOTAL WILD	TOTAL CATCH	NUMBER TAGS
		Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage			
30 1/	7/21 - 7/27					6.5	64			6.5	64	4.5	11.0	0
31	7/28 - 8/03					167.9	64			167.9	64	116.0	283.9	42
32	8/04 - 8/10					152.1	53			152.1	53	156.4	308.4	57
33	8/11 - 8/17					285.5	42			285.5	42	441.6	727.0	66
34	8/18 - 8/24					212.5	53			212.5	53	168.2	380.7	75
35	8/25 - 8/31					94.1	100			94.1	100	0.0	94.1	35
Total		0	0	0	0	918.5	51	0	0	918.5	51	886.6	1,805.2	275

1/ Proportions from week 31 were used to calculate hatchery contribution estimates.

2/ ADJUSTED: Excess adipose clips without tags used in calculating Cannery Creek hatchery contributions.

Table 6

## Hatchery Contribution to Pink Salmon Cost Recovery Fishery (X1000)

## Southwestern District Cost Recovery

Week	Date	AFK Hatchery		WN Hatchery		CC Hatchery		SG Hatchery		TOTAL HATCHERY		TOTAL WILD	TOTAL CATCH	NUMBER TAGS
		Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage			
24	6/09 - 6/15									0	0	0.1	0.1	
25	6/16 - 6/22									0	0	0.1	0.1	
Total		0	0	0	0	0	0	0	0	0	0	0.1	0.1	0

Continued

Table 6

## Hatchery Contribution to Pink Salmon Cost Recovery Fishery (X1000)

## Eastern District Cost Recovery

Week	Date	AFK Hatchery		WN Hatchery		CC Hatchery		SG Hatchery		TOTAL HATCHERY		TOTAL WILD	TOTAL CATCH	NUMBER TAGS
		Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage			
25	6/16 - 6/22							10.7	100	10.7	100	0.0	10.7	5
26	6/23 - 6/29							533.8	88	533.8	88	72.0	605.9	151
27	6/30 - 7/06							518.8	83	518.8	83	107.5	626.3	176
28	7/07 - 7/13							668.9	97	668.9	97	17.5	686.4	156
29	7/14 - 7/20							284.6	65	284.6	65	151.1	435.7	68
Total		0	0	0	0	0	0	2,016.9	85	2,016.9	85	348.1	2,365.0	556



Table 7

Hatchery Contribution to Pink Salmon Brood Stock (X1000)

Wally Noerenberg Brood Stock and Cost Recovery at Hatchery

Week	Date	AFK Hatchery		WN Hatchery		CC Hatchery		SG Hatchery		TOTAL HATCHERY		TOTAL WILD	TOTAL CATCH	NUMBER TAGS
		Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage			
34	8/18 - 8/24			14.3	100.0					14.3	100.0	0.0	14.3	22
35	8/24 - 8/31			67.6	100.0					67.6	100.0	0.0	67.6	57
36	9/01 - 9/07			79.1	73.4	2.3	2.1			81.4	75.5	26.4	107.8	71
37	9/08 - 9/14			89.1	82.4	1.2	1.1			90.3	83.5	17.8	108.1	74
38	9/15 - 9/21			69.8	53.6	1.5	1.2			71.3	54.8	58.8	130.1	47
39	9/21 - 9/28			12.7	28.8					12.7	28.8	31.5	44.3	10
Total		0	0	332.5	70	5.0	1	0	0	337.5	71	134.5	472.1	281

Continued

Table 7

## Hatchery Contribution to Pink Salmon Brood Stock (X1000)

## Cannery Creek Brood Stock and Cost Recovery at Hatchery 1/

Week	Date	AFK Hatchery		WN Hatchery		CC Hatchery		SG Hatchery		TOTAL HATCHERY		TOTAL WILD	TOTAL CATCH	NUMBER TAGS
		Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage			
34	8/18 - 8/24					1.9	24			1.9	24	5.9	7.8	1
35	8/24 - 8/31			1.5	2	61.1	92			62.6	94	4.0	66.6	46
36	9/01 - 9/07					78.5	89			78.5	89	10.2	88.7	61
37	9/08 - 9/14			3.3	3	104.9	88			108.2	91	10.9	119.1	70
38	9/15 - 9/21					55.2	64			55.2	64	31.3	86.5	31
Total		0	0	4.9	1	301.6	82	0	0	306.4	83	62.3	368.7	209

1/ ADJUSTED: Excess adipose clips without tags used in calculating Cannery Creek hatchery contributions.

Table 7

## Hatchery Contribution to Pink Salmon Brood Stock (X1000)

Solomon Gulch Brood Stock and Cost Recovery at Hatchery.

Week	Date	AFK Hatchery		WN Hatchery		CC Hatchery		SG Hatchery		TOTAL HATCHERY		TOTAL WILD	TOTAL CATCH	NUMBER TAGS
		Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage	Contribution	Percentage			
30	7/21 - 7/27							91.4	93	91.4	93	6.8	98.2	67
31	7/28 - 8/03							87.4	75	87.4	75	28.5	115.9	59
32	8/04 - 8/10							63.6	84	63.6	84	12.1	75.7	49
33	8/11 - 8/17							52.1	73	52.1	73	19.5	71.7	41
34	8/18 - 8/24							27.0	61	27.0	61	17.1	44.0	22
35	8/25 - 8/31							17.2	100	17.2	100	0.0	17.2	14
36 1/	9/01 - 9/07							0.9	100	0.9	100	0.0	0.9	0
37 1/	9/08 - 9/14							0.2	100	0.2	100	0.0	0.2	0
38 1/	9/15 - 9/21							0.1	100	0.1	100	0.0	0.1	0
Total		0	0	0	0	0	0	340.0	80	340.0	80	84.0	424.0	252

1/ Proportions from week 35 were used to calculate hatchery contribution estimates.

Table 8

## Contribution to Pink Salmon Fisheries and Broodstocks by Hatchery (X1000)

Common Property Fishery						
A. F. Koernig	Cannery Creek	W. H. Noerenberg	Solomon Gulch	Wild Stock	Total	% Hatchery
1,763	5,252	2,659	4,829	3,228	17,730	82%
Cost Recovery Fishery						
A. F. Koernig	Cannery Creek	W. H. Noerenberg	Solomon Gulch	Wild Stock	Total	% Hatchery
4	1,073	2,269	2,017	2,928	8,291	65%
Brood Stock and Roe Recovery						
A. F. Koernig	Cannery Creek	W. H. Noerenberg	Solomon Gulch	Wild Stock	Total	% Hatchery
0	307	337	340	281	1,265	78%
Totals						
1,767	6,631	5,265	7,186	6,437	27,286	76%

All numbers are in thousands

Table 9

## Hatchery Contributions to Sockeye Salmon Common Property Fishery (X1000)

Coghill District		Releases at Main Bay Hatchery								Remote Releases						Wild		Total Catch
		Coghill		Eshamy		Main Bay		Eyak		Coghill River		Eshamy River		Coghill (Davis)				
Period	Date	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
1	06/10															0.2	100	0.2
2	6/12 - 6/13															0.1	100	0.1
3	6/15 - 6/16															0.2	100	0.2
4	6/17 - 6/18					0.2	42.1							0.2	41.7	0.1	16.2	0.4
5	6/19 - 6/20					0.7	59.5									0.5	40.5	1.2
6 1/	6/21 - 6/22					0.3	16.1							0.3	20.1	1.1	69.7	1.7
7	6/23 - 6/25					1.1	16.1							1.4	20.1	4.3	69.7	6.8
8 1/	6/27 - 6/29					1.5	16.1							1.9	20.1	6.1	69.7	9.5
9 2/	7/01 - 7/02			0.0	0.5	0.2	3.1			2.9	42.8			2.2	31.5	1.5	22.1	6.9
10 2/	7/04 - 7/06			0.1	0.5	0.4	3.1			5.1	42.8			3.8	31.5	2.6	22.1	11.9
11	7/08 - 7/09			0.3	0.5	1.9	3.1			25.8	42.8			19.0	31.5	13.3	22.1	60.4
12 2/	7/11 - 7/13			0.2	0.5	1.0	3.1			13.7	42.8			10.1	31.5	7.1	22.1	32.1
13	7/14 - 7/16									2.6	19.6			1.3	9.5	9.5	70.9	13.4
14 3/	7/17 - 7/18									2.4	19.6			1.1	9.5	8.6	70.9	12.1
15 3/	7/20 - 7/22									1.0	19.6			0.5	9.5	3.6	70.9	5.0
16	7/23 - 7/27					2.7	21.2					8.2	63.6			2.0	15.2	13.0
17 GN, 16 PS 4/	7/29 - 8/03					0.5	21.2					1.6	63.6			0.4	15.2	2.5
18 GN, 17 PS 4/	08/04					0.1	21.2					0.3	63.6			0.1	15.2	0.4
19 GN, 18 PS 5/	08/06											0.9	90.5			0.1	9.5	1.0
20 GN, 19 PS	08/08											0.7	90.5			0.1	9.5	0.8
21 GN, 20 PS	08/14															0.5	100	0.5
22 GN, 21 PS 6/	08/22															0.1	100	0.1
23GN 6/	8/29 - 8/30															0.0	100	0.0
24 GN, 22 PS 6/	8/31 - 9/02															0.0	100	0.0
25 GN, 23 PS 6/	9/03 - 9/05															0.0	100	0.0
26 GN, 24 PS 6/	9/07 - 9/09															0.0	100	0.0
27 GN, 25 PS 6/	9/10 - 9/13															0.0	100	0.0
28GN 6/	9/14 - 9/16															0.0	100	0.0
Total		0	0	0.6	0.3	10.6	5.9	0	0	53.6	29.8	11.7	6.5	41.7	23.2	62.0	34.4	180.2

GN equals 'gillnet', PS equals 'purse seine'

- 1/ Proportions from Period 7GN were used to allocate the catch.
- 2/ Proportions from Period 11GN were used to allocate the catch.
- 3/ Proportions from Period 13GN were used to allocate the catch.
- 4/ Proportions from Period 16GN were used to allocate the catch.
- 5/ Proportions from Period 20GN/19PS were used to allocate the catch.
- 6/ Proportions from Period 21GN/20PS were used to allocate the catch.

Continued

Table 9

## Hatchery Contribution to Sockeye Salmon Common Property Fishery (X1000)

Eshamy District Common Property		— Releases at Main Bay Hatchery —						Remote Releases								Wild		Total Catch
		Coghill		Eshamy		Main Bay		Marsha Lake		Coghill River		Eshamy River		Coghill (Davis)				
Period	Date	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
1	7/01 - 7/02	1.3	1.9	3.0	4.4	43.7	64.1	0.9 1.8						0.8 1.8		20.2	29.6	68.3
2	7/04 - 7/05			0.9	1.8	39.6	82.8									5.7	11.9	47.9
3	7/08 - 7/09			5.5	11.1	21.9	44.4	5.4	11.1	5.5	11.1	10.9	22.2			0.0	0	49.2
4 1/	7/11 - 7/13			4.2	11.1	16.7	44.4	4.2	11.1	4.2	11.1	8.4	22.2			0.0	0	37.6
5 2/	7/15 - 7/17			12.3	39.3	6.1	19.6					2.0	6.5			10.8	34.6	31.3
6	7/18 - 7/20			11.4	39.3	5.7	19.6					1.9	6.5			10.0	34.6	29.0
7	7/22 - 7/24			9.0	69.3	2.0	15.3					2.0	15.4			0.0	0	13.0
8 3/	7/25 - 7/27			9.0	69.3	2.0	15.3					2.0	15.4			0.0	0	13.0
9 3/	7/29 - 7/31			9.4	69.3	2.1	15.3					2.1	15.4			0.0	0	13.5
10 3/	8/01 - 8/02			4.0	69.3	0.9	15.3					0.9	15.4			0.0	0	5.8
11 3/	8/05 - 8/06			2.0	69.3	0.4	15.3					0.4	15.4					2.9
Totals		1.3	0	70.5	22.7	141.1	45.3	10.5	3.4	9.7	3.1	30.6	9.8	0.8	0.3	46.8	15.0	311.3

- 1/ Proportions from the Eshamy District common property catch for period 3 were used to allocate the catch.  
2/ Proportions from the Eshamy District common property catch for period 6 were used to allocate the catch.  
3/ Proportions from the Eshamy District common property catch for period 7 were used to allocate the catch.

Table 9

## Hatchery Contribution to Sockeye Salmon Common Property Fishery (X1000)

Northern District			Releases at Main Bay Hatchery								Remote Releases						Wild		Total Catch
			Coghill		Eshamy		Main Bay		Eyak		Coghill River		Eshamy River		Coghill (Davis)				
Period	Date	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
8 1/	7/17-7/19															0.0		0.0	
10 1/	07/21															0.3	100	0.3	
11 1/-	07/23															0.1	100	0.1	
12 1/	07/25															0.3	100	0.3	
13 1/	07/27															0.2	100	0.2	
14 1/	07/29															0.3	100	0.3	
15 1/	07/31															0.4	100	0.4	
16 1/	08/02															0.4	100	0.4	
17	08/04															0.2	100	0.2	
18 1/	08/06															0.2	100	0.2	
19	08/08			0.2	100											0.0		0.2	
20	08/11											0.2	40.6			0.3	59.4	0.5	
21	08/14															0.5	100	0.5	
22	08/16											0.2	100			0.0		0.2	
23 2/	08/17															0.6	100	0.6	
24 2/	08/18															0.2	100	0.2	
25 2/	08/20															0.2	100	0.2	
26 2/	08/21															0.1	100	0.1	
27 2/	8/22 - 8/23															0.0	100	0.0	
28 2/	8/24 - 8/26															0.0	100	0.0	
29 2/	8/27 - 8/31															0.0	100	0.0	
Totals		0	0	0.2	4.1	0	0	0	0	0	0	0.4	8.5	0	0	4.5	87.7	5.1	

1/ Proportions from Period 17 were used to allocate the catch.

2/ Catch not sampled. All fish presumed to be wild.

Continued

Table 9

Hatchery Contribution to Sockeye Salmon Common Property Fishery (X1000)

Southwestern District			Releases at Main Bay Hatchery						Remote Releases						Gulkana		Wild		Total Catch
			Coghill		Eshamy		Main Bay		Eyak		Coghill River		Eshamy River						
Period	Date		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
11 1/	7/23 - 7/24				0.0	10.7							0.0	75.2			0.0	14	0.0
12	07/25				0.1	10.7							1.0	75.2			0.2	14	0.0
13	07/27				0.2	19.2							0.8	65			0.1	8.6	1.4
14	07/29				0.8	37.7	0.1	7.2					0.6	28.3			0.7	33.5	1.2
15	07/31				0.5	41.3							0.2	15			0.6	43.7	2.1
16	08/02				1.2	50.6							0.3	14.3			0.8	35.1	1.3
17	08/04				0.3	22.9							0.8	53.1			0.3	24	2.3
18	08/06											0.5	100				0.0		1.4
19	08/08												0.3	100			0.0		0.5
20	8/10 - 8/14												0.8	83.3			0.2	16.7	0.3
21 2/	8/15 - 8/16												0.1	83.3			0.0	16.7	1.0
22 2/	8/17 - 8/19												0.0	83.3			0.0	16.7	0.1
23 2/	8/20 - 8/21												0.0	83.3			0.0	16.7	0.0
24 2/	8/22 - 8/23												0.0	83.3			0.0	16.7	0.0
25 2/	8/24 - 8/26												0.0	83.3			0.0	16.7	0.0
Totals			0	0	3.2	27.2	0.1	0.7	0	0	0.5	4.5	5.1	42.7	0	0	0.0	24.8	11.9

1/ Proportions from Period 12 were used to allocate the catch.

2/ Proportions from Period 20 were used to allocate the catch.

Continued



Table 9

## Hatchery Contribution to Sockeye Salmon Common Property Fishery (X1000)

Eastern District		Releases at Main Bay Hatchery								Remote Releases						Wild		Total Catch
Period	Date	Coghill		Eshamy		Main Bay		Eyak		Coghill River		Eshamy River		Coghill (Davis)		No.	%	
1	07/02															0.4	100	0.4
2	07/04									0.1	5.9			0.5	41.5	0.6	52.5	1.2
3	07/06															0.3	100	0.3
4	07/08															0.2	100	0.2
5 1/	07/10															0.3	100	0.3
6	07/12															0.4	100	0.4
7	07/14															0.3	100	0.3
8	7/17-7/19															0.6	100	0.6
10	07/21															0.2	100	0.2
11	07/23															0.1	100	0.1
12 2/	07/25															0.0	100	0.0
13 3/	07/27															0.1	100	0.1
14	07/29															0.1	100	0.1
15	07/31															0.0	100	0.0
16 4/	08/02															0.0	100	0.0
20	8/10 - 8/14															0.1	100	0.1
21 5/	8/15 - 8/17															0.0	100	0.0
22 5/	8/18 - 8/19															0.0	100	0.0
27 5/	9/01 - 9/04															0.0	100	0.0
28 5/	9/05 - 9/07															0.0	100	0.0
Totals		0	0	0	0	0	0	0	0	0.1	1.6	0	0	0.5	11.0	3.9	87.4	4.4

- 1/ Proportions from Period 6 were used to allocate the catch.  
2/ Proportions from Period 11 were used to allocate the catch.  
3/ Proportions from Period 14 were used to allocate the catch.  
4/ Proportions from Period 15 were used to allocate the catch.  
5/ Proportions from Period 20 were used to allocate the catch.

Table 10

## Hatchery Contribution to Sockeye Salmon Cost Recovery Fishery (X1000)

Main Bay Cost Recovery	--- Releases at Main Bay Hatchery ---						Remote Releases								Wild		Total Catch
	Coghill		Eshamy		Main Bay		Eyak		Coghill River		Eshamy River		Coghill (Davis)				
Date	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
06/23					4.4	94.9	0.2	5.1							0	0	4.6
06/25 1/					3.8	94.9	0.2	5.1							0	0	4.0
06/26 1/					1.9	94.9	0.1	5.1							0	0	2.0
06/28 2/			1.1	8.3	11.7	91.7									0	0	12.8
07/03			1.2	8.3	13.7	91.7									0	0	14.9
07/21 3/			7.4	100											0	0	7.4
07/25 3/			9.7	100											0	0	9.7
07/28 3/			4.5	100											0	0	4.5
08/01 3/			5.0	100											0	0	5.0
08/04 3/			3.5	100											0	0	3.5
08/11 3/			7.1	100											0	0	7.1
Totals	0	0	39.5	52.3	35.5	47.0	0.5	0.7	0	0	0	0	0	0	0	0	75.5

- 1/ Proportions from 6/23 were used to allocate the catch.  
2/ Proportions from 7/03 were used to allocate the catch.  
3/ Catch was allocated to Eshamy stock released at Main Bay Hatchery

Continued

Table 10

## Hatchery Contribution to Sockeye Salmon Cost Recovery Fishery (X1000)

Marsha Bay Cost Recovery	--- Releases at Main Bay Hatchery ---						Remote Releases								Wild		Total Catch
	Coghill		Eshamy		Main Bay		Eyak		Coghill River		Eshamy River		Marsha Bay Lake				
Date	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
06/28													0.7	100	0	0	0.7
07/03													3.1	100	0	0	3.1
07/08													2.5	100	0	0	2.5
07/13													2.4	100	0	0	2.4
07/19													1.4	100	0	0	1.4
Totals	0	0	0	0	0	0	0	0	0	0	0	0	10.2	100	0	0	10.2

Table 11

Hatchery Contribution to Sockeye Salmon Hatchery Brood Stock (X1000)

Main Bay Hatchery Rack Return			Releases at Main Bay Hatchery						Remote Releases						Wild		Total Catch
Week	Date	Coghill		Main Bay		Eshamy		Eyak		Coghill River		Eshamy River		Coghill (Davis)			
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	
25	6/16 - 6/22							0.0	100							0.0	0.0
26	6/23 - 6/29							0.0	100							0.0	0.0
29	7/14 - 7/20							0.1	100							0.0	0.1
38	9/15 - 9/21																0.0
39	9/22 - 9/28			0.1	11.9	1.0	80					0.0	4			0.1	4.1
40	9/29 - 10/05			0.1	2.7	4.0	72					0.2	4.5			1.2	20.9
						0.1	74					0.0	22.1			0.0	0.2
Totals		0	0	0.3	4.1	5.1	71.9	0.2	2.2	0	0	0.3	4.7	0	0	1.2	17.0
																	7.1

Table 12

## Hatchery Contribution to Copper River Sockeye Common Property Fishery (X1000)

Copper River District		Main Bay		Coghill River		Marsha Lake		Crosswind Lake		Summit Lake		Total Hatchery		Wild + Paxson Lk. 1/		Total Catch	No. of Tags
Period	Date	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
1	5/16 - 5/17									0.4	0.4	0.4	0.4	109.6	99.6	109.9	7
2	5/20 - 5/21									0.5	0.3	0.5	0.3	187.6	99.7	188.2	15
3	5/27							0.1	0	0.9	0.3	1.0	0.4	289.7	99.6	270.7	23
4	5/30									0.1	0.1	0.1	0.1	151.2	99.9	151.3	3
5	6/01									0.2	0.3	0.2	0.3	78.1	99.7	78.4	4
6	6/03 - 6/04									0.1	0.1	0.1	0.1	107.4	99.9	107.5	3
7	6/06 - 6/07									0.2	0.1	0.2	0.1	151.9	99.9	152.1	5
8	6/10 - 6/11							1.4	1.1	0.0	0.0	1.4	1.1	128.0	98.9	129.4	6
9	6/13 - 6/15							1.8	1	0.1	0	1.8	1.1	170.6	98.9	172.4	13
10	6/17 - 6/19	0.3	0.3					3.6	2.9	0.3	0.3	4.2	3.5	118.2	96.5	122.5	18
11	6/20 - 6/22	1.1	1.4	0.6	0.7	0.3	0.4	5.9	7	0.6	0.7	8.5	10.2	74.8	89.8	83.2	35
12	6/24 - 6/25	0.7	0.7	0.3	0.3			11.3	11.6	0.3	0.4	12.6	12.9	85.0	87.1	97.6	51
13	6/27 - 6/29	1.6	1.5					13.8	13.2	0.5	0.5	15.8	15.2	88.7	84.8	104.5	40
14	7/01 - 7/02			2.0	1.5			51.8	38.5	1.2	0.9	55.0	40.9	79.7	59.1	134.7	85
15	7/04 - 7/06			0.4	0.5			19.9	21.4	0.9	0.9	24.9	26.8	67.9	73.2	92.8	57
16	7/08 - 7/09	3.7	4	0.6	11.3			18.8	21	0.4	0.5	19.8	22.1	69.5	77.9	89.3	42
17	7/11 - 7/13							11.1	20.1	0.4	0.7	11.5	20.8	43.6	79.2	55.0	7
18	7/15 - 7/16	1.0	2					7.6	15.9	0.2	0.3	8.8	18.3	39.2	81.7	48.0	12
19	7/18 - 7/20	0.3	0.5					18.5	30.4	1.5	2.4	20.2	33.3	40.5	66.7	60.7	40
20	7/22 - 7/23							12.8	12	0.3	0.5	13.1	27.9	34.8	72.1	47.8	32
21	7/25 - 7/27							6.9	32.7	0.1	0.4	7.0	33.1	14.2	66.9	21.2	33
22	7/29 - 7/30							5.7	42	0.2	1.6	5.9	43.6	7.6	56.4	13.5	30
23	8/01 - 8/03							2.7	29.4	0.0		2.7	29.4	6.4	70.6	9.0	3
24	8/05 - 8/06							5.0	49.5	0.1	1.1	5.1	50.7	5.0	49.3	10.1	10
25	8/08 - 8/10							1.8	30.4			1.8	30.4	4.1	69.6	5.9	3
26 2/	8/12 - 8/14							0.0	30.4			0.0	30.4	0.0	69.6	0.0	0
27 2/	8/15 - 8/16							0.0	30.4			0.0	30.4	0.0	69.6	0.0	0
28 2/	8/19 - 8/20							0.0	30.4			0.0	30.4	0.0	69.6	0.0	0
29 2/	8/22 - 8/23							0.0	30.4			0.0	30.4	0.0	69.6	0.0	0
30 2/	8/26 - 8/27							0.1	30.4			0.1	30.4	0.2	69.6	0.2	0
31	8/29 - 8/30											0.0		0.1	100	0.1	0
32	9/02 - 9/03											0.0		0.1	100	0.1	0
33	9/05 - 9/06											0.0		0.1	100	0.1	0
34	9/09 - 9/10											0.0		0.0	100	0.0	0
35	9/12 - 9/13											0.0		0.0	100	0.0	0
Totals		8.6	0.4	3.9	0.2	0.3	0.0	200.4	8.5	9.6	0.4	222.8	9.5	2,133.6	90.5	2,356.4	577

- 1/ Paxson Lake hatchery contribution estimated to be about 104,972 fish ; hatchery contribution from Paxson Lake is included with wild. as no CWT's are applied to these fish. Estimation is average of Crosswind and Summit lake contribution.
- 2/ Proportions from period 25 were used to calculate contribution estimates

Table 13

## Hatchery contribution to Copper River Personal Use Fishery (X1000)

Chitina Personal Use Fishery		Crosswind Lake		Summit Lake		Total Hatchery		Wild + Paxson Lk. 1/		Total Catch	No. of Tags
Period	Date	No.	%	No.	%	No.	%	No.	%		
1	5/27 - 6/02					0.0		0.7	100.0	0.7	0
2	6/03 - 6/09			0.2	3.1	0.2	3.1	5.8	96.9	6.0	1
3	6/10 - 6/16					0.0		6.0	100.0	6.0	0
4	6/17 - 6/23					0.0		15.6	100.0	15.6	0
5	6/24 - 6/30					0.0		9.0	100.0	9.0	0
6	7/01 - 7/07					0.0		7.9	100.0	7.9	0
7	7/08 - 7/14	0.7	7.7			0.7	7.7	8.6	92.3	9.4	3
8	7/15 - 7/21	1.5	18.7	0.1	0.6	1.5	19.4	6.4	80.6	7.9	10
9	7/22 - 7/28	2.1	27.7	0.1	0.7	2.2	28.4	5.4	71.6	7.6	11
10	7/29 - 8/04	1.5	20.4	0.1	1.6	1.6	22.0	5.8	78.0	7.4	12
11	8/05 - 8/11	2.2	30.6	0.0	0.5	2.2	31.1	4.9	68.9	7.1	20
12	8/12 - 8/18	2.2	24.7	0.2	2.5	2.4	27.2	6.5	72.8	9.0	15
13	8/19 - 8/25	0.3	19.0			0.3	19.0	1.3	81.0	1.6	2
14	8/26 - 9/01	0.3	65.1			0.3	65.1	0.1	34.9	0.4	1
Totals		10.8	11.3	0.7	0.7	11.5	12.0	84.2	88.0	95.6	75

1/ Paxson Lake hatchery contribution was estimated to be 5730 fish. Paxson Lake hatchery fish included with wild as no CWT's are applied to these fish. Estimation is average of Crosswind and Summit lake contribution.

Table 14

## Hatchery Contribution to Brood Stock and Escapement (X1000)

<b>Brood and Escapement Surveys</b>					
Stat Week	Date	Gulkana Hatchery Number	Crosswind Lk. 1/ Number	Summit Lake Number	Total Number
31	7/27 - 8/03	0.8			0.8
32	8/04 - 8/10				0.0
33	8/11 - 8/17		1.5		1.5
34	8/18 - 8/24	1.0	6.7		7.7
35	8/25 - 8/31	1.0	18.8	0.1	20.0
36	9/01 - 9/07	1.1	16.9	0.3	18.3
37	9/08 - 9/14	5.2	25.3	0.3	30.7
38	9/15 - 9/21	7.1	21.0	0.3	28.4
39	9/22 - 9/28	10.6	2.5	0.3	13.4
40	9/29 - 10/05	5.6		0.5	6.1
41	10/06 - 10/12	8.9		0.4	9.4
42	10/13 - 10/19	3.4			3.4
43	10/20 - 10/26	2.8			2.8
44	10/27 - 11/02	3.4			3.4
Totals		50.9	92.8	2.3	145.9

1/ Count was truncated after 9/25/96 because some of the fish counted between 9/26 and 10/02 (6502 fish) were counted more than once.

Table 15

## Main Bay Hatchery Survival by Tag Code

Brood year 1991 survivals		Tag Code	Release Wt.(gms)	Survival Est. %	Experiment
Stock					
Eyak		312044	5.6	7.52	0-Check Brood Development
Eshamy		312157	5.1	3.2	Remote Smolt Release
Coghill/ Davis L.		312156	8.1	7.78	Remote Smolt Release
Coghill		312049	3.1	5.05	Pre-smolt into Marsha Lake
Coghill		312152	6.4	8.2	Time of Release - on site
Coghill		312153	5.5	2.97	Size at Release - on site
Coghill		312154	8.1	3.33	Size at Release - on site
Coghill		312155	9.1	0.7	Size at Release - on site
Coghill		312158			Destroyed due to IHN
Eshamy		312151			Destroyed due to IHN

  

Brood year 1992 survivals		Tag Code	Release Wt.(gms)	Survival Est. %	Experiment
Stock					
Eyak		312150			Destroyed due to IHN
Eshamy		312341	6.4	14.82	On site
Eshamy		312347	7.6	6.9	Remote Release
Coghill		312346	8.7	7.64	Remote Release
Coghill		312342	9.4	6.06	Size at Release
Coghill		312343	6.5	4.76	Size at Release
Coghill		312344	6.4	7.66	Size at Release
Coghill		312345	11.1	7.64	Size at Release